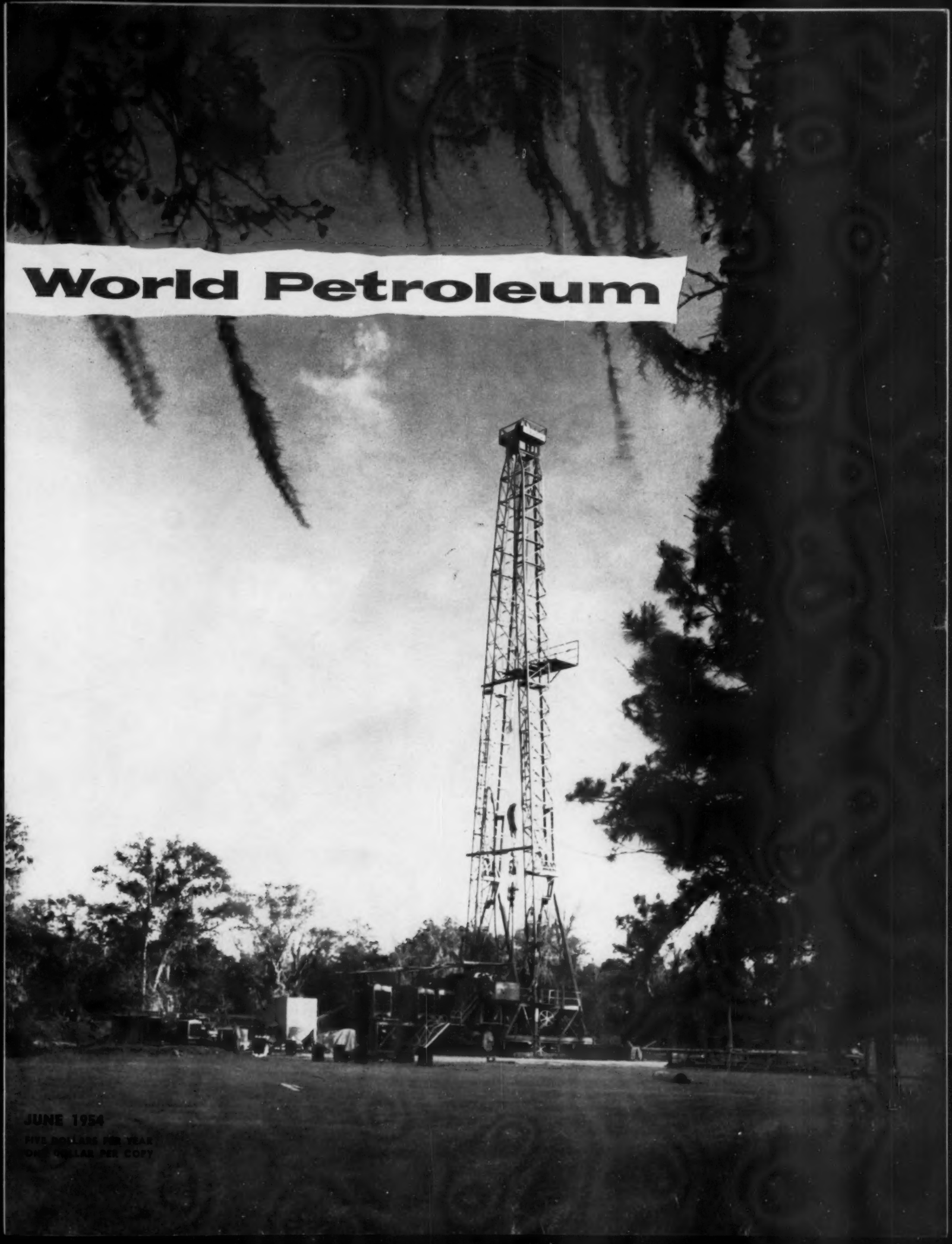


World Petroleum

JUNE 1954

FIVE DOLLARS PER YEAR
ONE DOLLAR PER COPY

AMONG THESE

314 PACKERS

THERE'S ONE THAT'S TAILOR-MADE

TO DO YOUR JOB

Write for further information

LANE WELLS

Engineered Packers

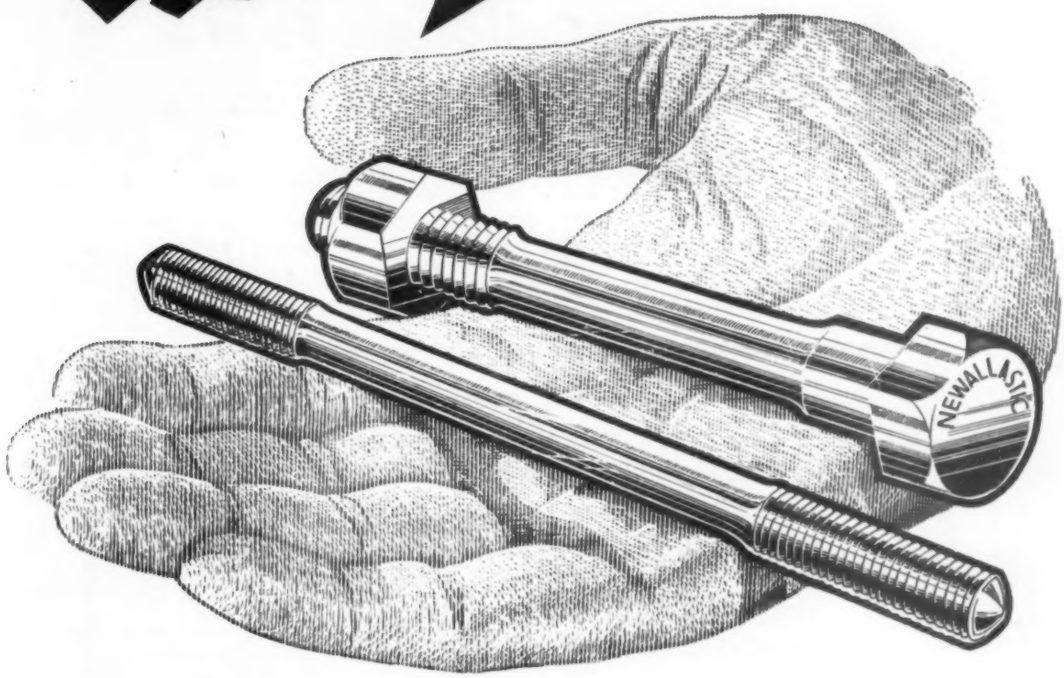
Tomorrow's Tools - Today!®

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

AP-703

Unique



"Newallastic" bolts and studs have qualities which are absolutely unique. They have been tested by every known device, and have been proved to be stronger and more resistant to fatigue than bolts or studs made by the usual method.

C. P. Newall & Co., Ltd.

POSSILPARK GLASGOW · N

What's NEW

In Perforating, Logging, and Fishing Tool Services

Latest News About New Tools, Techniques and Services

Another McCullough First—

NOW! *Recover All Free Pipe in*

ONE RUN

McCullough, world's fastest back-off service, again reduces time required to recover stuck pipe.—Another 50% saving in rig time with this amazing, new combination tool.

A GREAT COMBINATION

McCULLOUGH MAGNA-TECTOR

(FREE POINT FINDER)

AND STRING SHOT BACK-OFF

PERFORMS BACK-OFF OPERATION IN *ONE* ELECTRIC WIRE LINE RUN IN THE HOLE!

ONE TRIP IN THE HOLE ***COMPLETES ALL THESE OPERATIONS —***

1. The Magna-Tector is operated to find lowest free point in stuck drill pipe or tubing, by STRETCH and TORQUE.
2. The first joint above the stuck point is exactly located by a special Magnetic Collar Locator in the Magna-Tector.
3. The String Shot Back-off Tool is fired to loosen the joint, permitting all free pipe to be backed off and removed from the well.

"THE ONLY *ONE-TRIP* BACK-OFF SERVICE"

The new combination McCullough Magna-Tector and String Shot is available at most McCullough service locations . . . call your McCullough Service Engineer.

WRITE FOR NEW, 4-PAGE TECHNICAL BULLETIN NO. 402

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

McCULLOUGH TOOL COMPANY
5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas
CABLE ADDRESS: MACTOOL
EXPORT OFFICE: Los Angeles, California
CANADA: Edmonton, Calgary, Grande Prairie, Alb.; Regina, Saskatchewan.
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Midkiff, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton, Hominy, Wewoka. **ARKANSAS:** Magnolia. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper, Cody, Newcastle. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

WORLD PETROLEUM for June, 1954. Vol. 25, No. 6. June, 1954. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Acceptance at East Stroudsburg, Pa., under Section 34.64 P. L. & R. Authorized. Subscription rate: $5.00 per year, single copies $1.00.

Copyright 1954, by Mona Palmer, Trustee.

Who gets the money Standard takes in?

Goods and services—cost us $324,743,000. This was spent with thousands of firms, large and small in hundreds of cities.

Crude oil was a big item. To supplement our own large production we bought $135,600,000 worth from crude oil producers.

Wear and tear, depreciation and maintenance amounted to $157,834,000. Millions went to workmen and material firms.

New construction, such as improved refinery facilities, to supply you with more and better products, added up to $145,000,000.

Exploration to replace oil our customers use is costly. Our stepped-up search to find new oil reserves cost us $79,000,000 in 1953.

Employees' wages for time worked took $163,947,000 of our income. Another $43,000,000 went for employee benefits.

Taxes paid by Standard to U. S., states, counties, cities came to $106,300,000—enough to buy plenty of schools, bridges, etc.

112,000 shareholders' profits came from what was left—$86,020,000 or about 5½¢ for each dollar's worth of Company stock.

Your picture belongs here, too. Because most of the $1,156,757,000 Standard Oil Company of California took in last year ended up with you—the public. Whether one of the hundreds of millions of dollars worth of checks Standard wrote last year was sent to you, or spent with you, or helped make possible better gasoline and oil for your car, you and practically everyone else in the West benefited. Thousands of merchants and professional people in hundreds of towns profited from the pay checks Standard Oilers spent. Our tax payments helped finance schools for your children, parks for vacationers, and bridges for motorists. Carpenters, steelmen, lumberjacks benefited from the facilities we built and the maintenance work we did. It all fits together: 1953 was a good year for Standard because so many of you thought our products well made and worth buying. And by making it a good year for us, you made it a good year for many others.

STANDARD OIL COMPANY OF CALIFORNIA

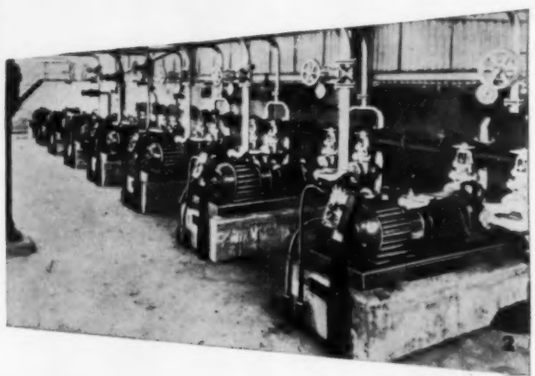
75 years of planning ahead to serve you better

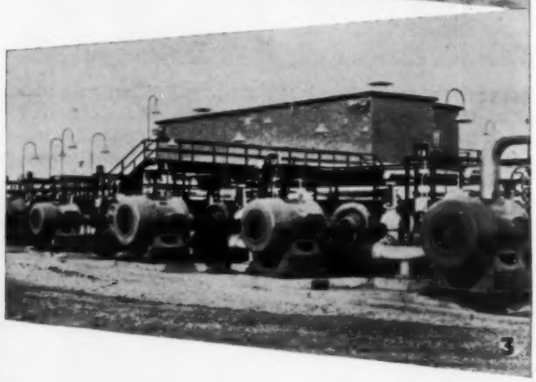
FLAMEPROOF MOTORS

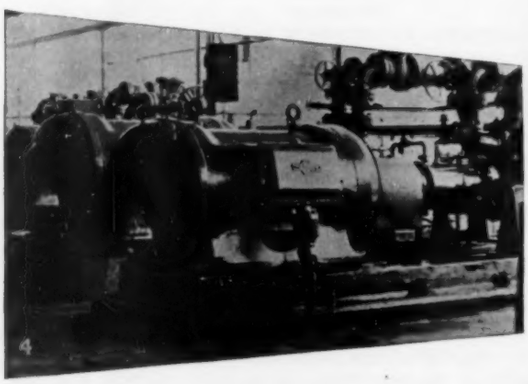
certified for group 2 and group 3 gases

A complete range of Metrovick Buxton-certified flameproof motors is available for refineries and petro-chemical works, for either indoor or outdoor use. Machines with either ball and roller bearings, or sleeve bearings, can be supplied, and all are suitable for hot product pumps.

A specialised range of splash-proof well-pump motors and industrial type machines for non-hazardous locations is also available.





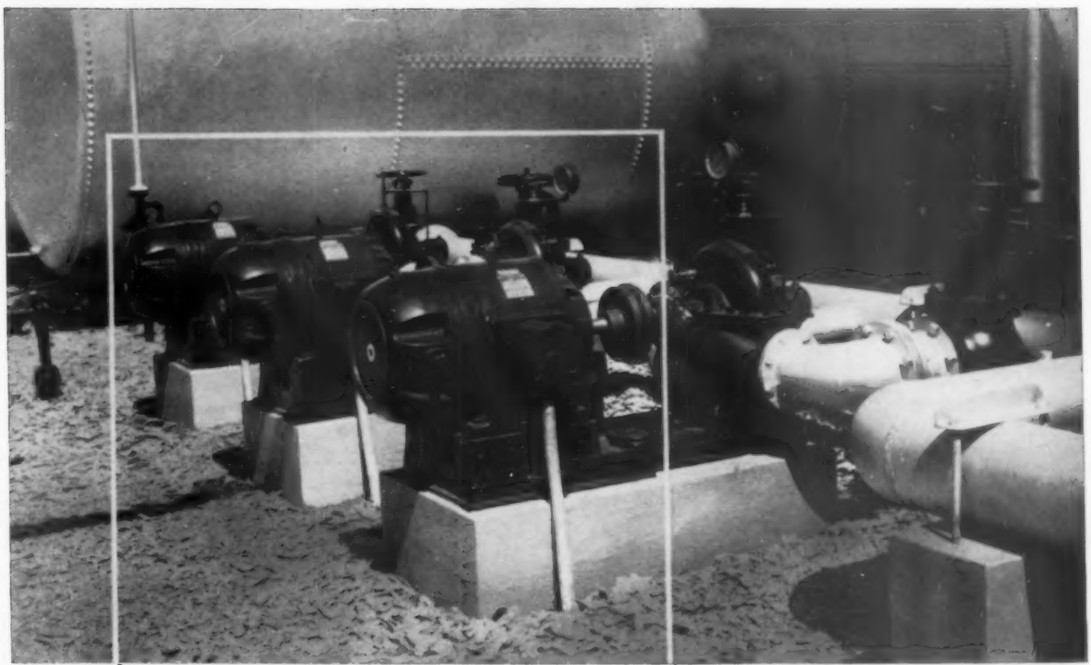


1. A range of flameproof motors in one of the main pumping stations at Scottish Oils, Grangemouth Refinery. 2. Type KFB flameproof motors driving Sigmund pumps at Shell Stanlow Refinery. 3. 300-600 hp outdoor flameproof motors at the product loading station at Esso Refinery, Fawley. 4. 125 hp 3500 rpm T.E.F.C. motors driving oil pumps at Trinidad Leaseholds, Pointe-a-Pierre Refinery, British West Indies.

METROPOLITAN-VICKERS

ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

J/O 302

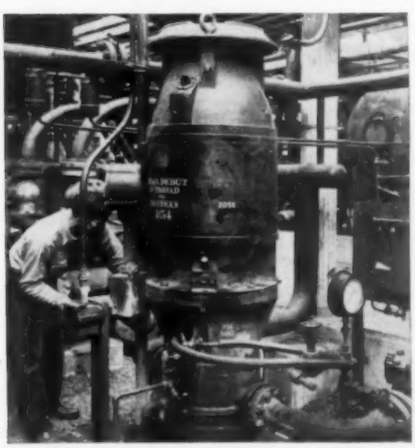


3 centrifugal, circulating-water pumps at refinery driven by G-E explosion-proof, squirrel-cage, induction motors—300-hp, 1800 rpm each.

G-E Explosion-Proof MOTORS give you continuous SAFETY

General Electric, using long experience with oil industry needs, has built a broad line of explosion-proof motors that reduce your refinery hazards with these features:

- **Sturdy, cast-iron, double-shell frame and end shields, plus . . .**
- **Reinforcing ribs for strong enclosure . . .**
- **Non-sparking fan . . .**
- **Explosion-proof box**



G-E vertical, explosion-proof, induction motor drives refinery charge pump.

THESE BUILT-IN SAFETY FEATURES HELP YOU!

Save Installation Expense—No special isolation or remote coupling needed.

Reduce Insurance Cost—Economy of G-E units is greater.

Build Production—With greater safety, work stoppages are cut and personnel protected.

Save on Maintenance—Motor life is prolonged with compact enclosure, tight joints, corrosion-resistant materials. Yet less care is needed.

G-E Control Puts Safety First, Too! G-E oil-immersed starters have all contact tips, connections, terminals at least 6" below oil level. Coordinated starters, circuit breakers, overload relays protect motor under all overload and short circuit conditions.

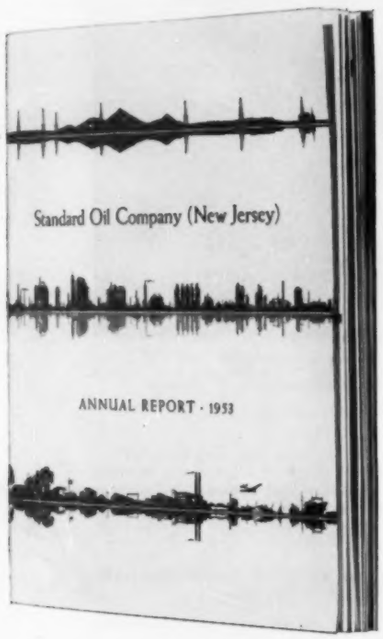
See your G-E representative. Learn how G-E motors and control make continuous safety work to your profit. Write for Bulletin GEA-4131. International General Electric Co., Apparatus Sales, 570 Lexington Ave., New York 22, N. Y., U.S.A. 1A-53-178

You Can Put Your Confidence In—

GENERAL ELECTRIC

—U.S.A.—

A report that concerns everyone!



THE BUSINESS OF FINDING, refining and bringing to market the world's oil is a big and continuing job—one in which Standard Oil Company (New Jersey), among many others, plays a significant part.

How this job is done affects America in many ways—and is therefore important to every American. Our Annual Report for 1953, recently mailed to the 284,000 shareholders who own this company, tells about our part in this job, and some of its high lights may interest you.

* * * *

Today, when many thoughtful people are wondering about the economic future, we're glad to say that things look good to us. As far as we can see from the evidence available, the economy of the free world is stronger now than at any time since World War II.

But more important than hopeful words are positive actions.

Since 1946 Standard Oil Company (New Jersey) and its affiliated companies have spent nearly 4 billion dollars on new facilities to help supply the oil needs of free people...a 4-billion-dollar vote of confidence in the future. This year we intend to invest even more than the 500 million dollars we spent last year.

The result? Continuously increasing reserves of oil in the ground. Modern equipment. More efficient operations. New and better products.

Our customers used more oil in 1953 than ever before, which meant that people lived better, that industry was more active, that the free world's economy prospered.

We took in more money, and paid out more wages and salaries to employees, more taxes to governments, more dividends to shareholders than in any previous year.

Esso research made great strides... outstanding gasolines and lubricants were among the results of dynamic progress in this field.

* * * *

These activities — these investments made to get people the oil they need—are vital factors in our nation's economy, for they directly affect thousands of businesses and individuals. And everybody benefits.

This is a continuing process. It has been our job for 72 years. It will continue to be our job.

IF YOU D BE INTERESTED in receiving a copy of our 1953 Annual Report, write Standard Oil Company (New Jersey), Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

STANDARD OIL COMPANY (NEW JERSEY)

and affiliated companies

Esso

Washington PIPE LINE

Northwestern states gas supply question approaching decision

By Joseph B. Huttlinger

RECENT INDICATIONS have pointed to the possibility of a decision in the near future on the hotly contested question of who is to supply natural gas to the northwestern area of the United States. The decision rests with the Federal Power Commission, which has had the case before it, in one form or another, for a matter of six years. Beginning in June 1952, hearings were held before an FPC examiner for a total of 192 days, accumulating testimony that filled 28,000 pages, plus 16 pages of exhibits. In volume of words the case has set a top record for all commission hearings.

As everyone having even a casual interest in the case is well aware by this time, the contestants for the right to pipe natural gas to consumers in the Washington-Oregon marketing region are two in number. One is the Pacific Northwest Pipeline Corporation of Houston, Texas, which proposes to draw its gas supply from the San Juan Basin of southwestern Colorado. The other is the Westcoast Transmission Company Ltd. of Calgary, Canada, which offers fuel from the prolific fields of British Columbia and the Peace River district of Alberta.

The case derives an international aspect from the fact that one of the claimants is a Canadian corporation, and in this respect the decision of the commission, whichever way it goes, will establish a precedent.

Final briefs of the two companies were filed with the commission on May 11, and oral arguments were set for June 1 and 2 before the full committee of five members under the chairmanship of Jerome Kuykendall of the State of Washington. Following that hearing it was assumed that the commission would not require a long time to form its opinion and that a decision might be announced by July 1.

A surprising development was injected into the case during the second week of May by a brief filed by the staff of the commission recommending that both applications be rejected. The ground stated for this recommendation was that neither applicant had satisfied all the requirements of the commission. Of the Pacific Northwest project, the staff report said: "The pipe not being designed to meet the market demands eliminates the necessity of further comment." Of the Westcoast plan it says: "Neither the physical location of the pipe line system nor the preliminary plans, specifications and estimates of construction costs upon which the feasibility of this project will be determined have been made." On gas supply, the staff said, "a sufficient gas supply cannot be found for either the Pacific or the Westcoast project," on the basis of the record.

It is pointed out, however, that this staff report is "merely one more brief" and may be disregarded or overruled by the commission as has happened in the case of previous staff reports.

Both Westcoast and Pacific Northwest insist in their briefs that they have ample supplies of gas available, have the needed financial resources and are prepared to begin construction without delay, once FPC approval is given. On the subject of reserves, the Canadian company declares:

"Westcoast Ltd. will draw gas from the largest gas-producing area which has ever been made available to any pipe line company and which has no present market nor other economic outlet. Although the area has been under active exploration only since 1950, the rate of discovery has far exceeded that in the United States."

The gas contracts of the company name prices of five cents per MCF at the start, ranging up to 13 cents per MCF at the end of 22 years, after which new contracts are to be written. The price at which it can obtain gas, the company asserts, is lower than that prevailing in the United States and on broad economic lines it argues that the utilization of Canadian supplies will be to the advantage of the nation.

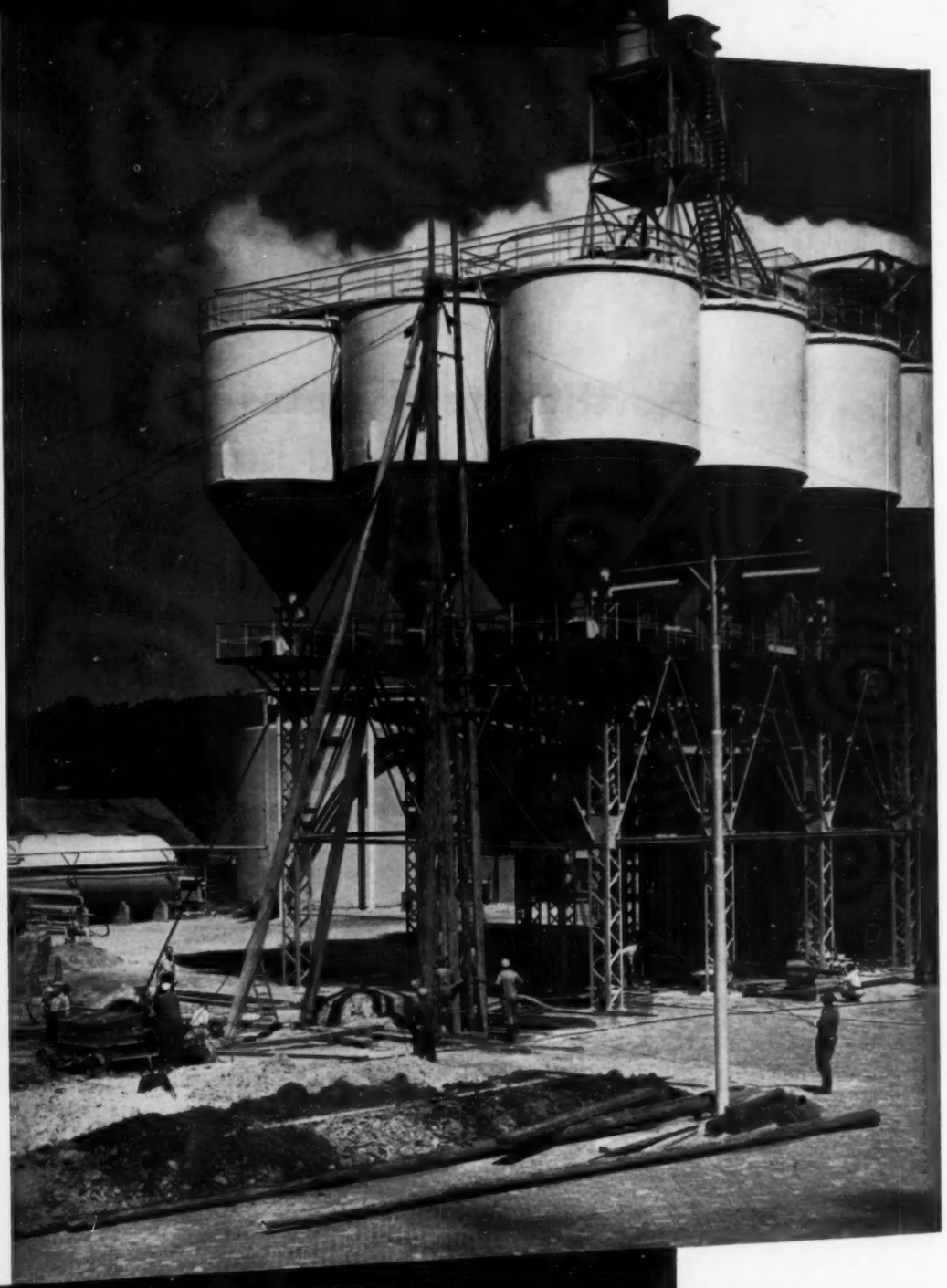
On the other hand, Pacific Northwest, proposing a longer pipe line, totaling 1,461 miles of main, and a higher total cost, $160 million, offers to lay down gas in the markets at competitive prices, and at prices below competing fuel oil and coal. Its brief endeavors to make a point with the Commission that since Westcoast is a Canadian chartered company, only part of its system will be under FPC jurisdiction, while a line wholly in United States territory will be completely under the commission's control at all points.

The opinion of those who have impartially followed the case through its long drawn-out course is that either company is capable of carrying out its promises and that the decision of the commission logically should be based upon long term consideration of the relative economic advantages of utilizing Canada's growing supplies for the rapidly expanding northwestern market or seeking to confine it to a wholly domestic source.

KETJENCAT

M.S. FLUID CRACKING CATALYST

based on the processes of AMERICAN CYANAMID COMPANY New York



Enlargement of the plant capacity enables us to meet the increasing demand

Koninklijke Zwavelzuurfabrieken v h

KETJEN N V AMSTERDAM - THE NETHERLANDS

Founded 1835

Friends

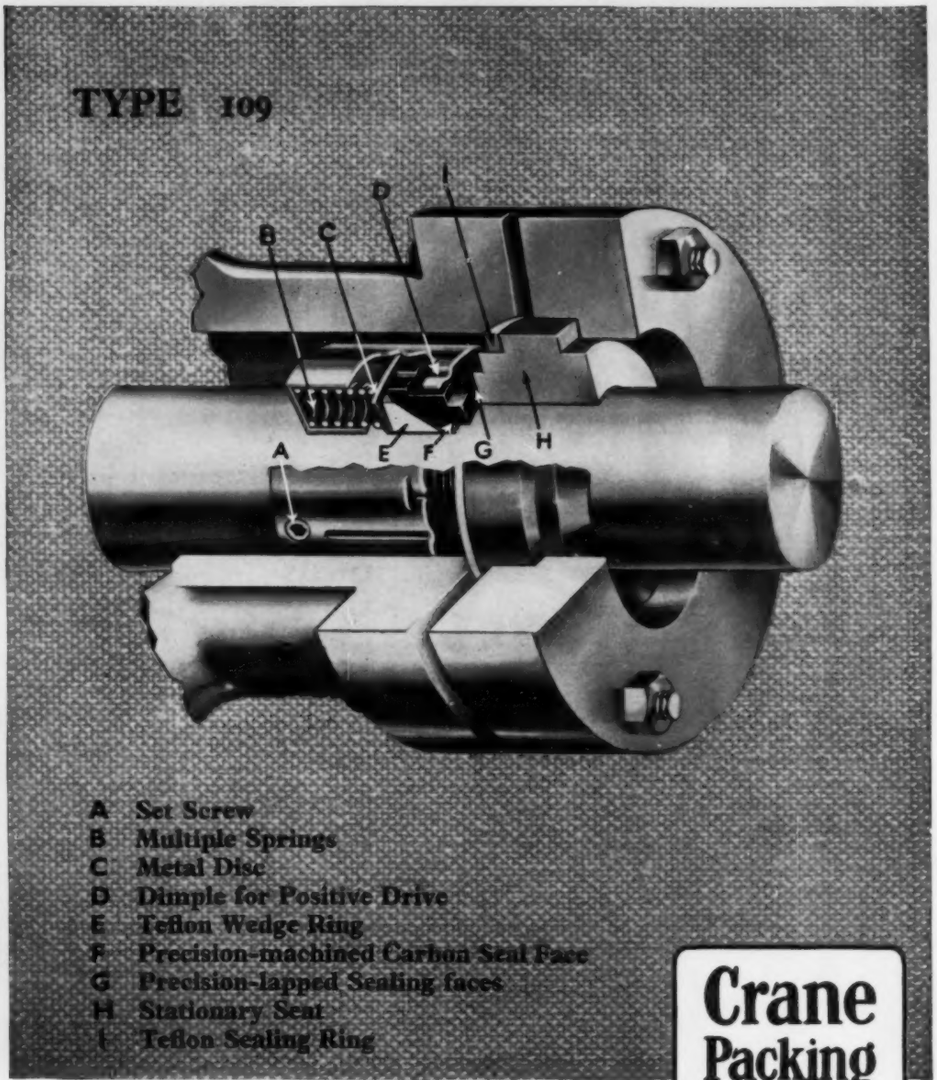
Muhammad ibn Jawad's main interest at the moment seems to be his donkey "Yash." Muhammad lives in a small village in the Qatif oasis area of eastern Saudi Arabia and has grown up close to the hustle and bustle of oil operations. Thousands of Saudi Arabs have oil jobs with the Arabian American Oil Company. They have been trained for their jobs and many came from villages like Al Awamiyah where Muhammad lives.

When Muhammad is old enough there is a good possibility he will become an oil man and help develop his country's oil resources.

Aramco ARABIAN AMERICAN OIL CO.

DHAHRAN, SAUDI ARABIA NEW YORK, U.S.A.

A Mechanical Shaft Seal



for High Temperature & Corrosive Services

Crane Packing LTD OF SLOUGH ENGLAND A COMPANY

This Type 109 Mechanical Shaft Seal will seal off corrosive fluids or gases which are being handled at temperatures up to 485° F. and at pressures up to 750 p.s.i. on such applications as centrifugal pumps, turbines, positive displacement pumps, agitators, etc. It is the first Seal of its kind to be manufactured in this country—it is precision engineered and corrosion resistant materials can be used for each component.

In order to impart to the assembly the required degree of flexibility a flexible wedge ring is used (see "E" on diagram). The new chemically inert polymerised plastic fluorethylene known as Teflon in the U.S.A. and as Fluon in this country, is the material from which this wedge ring is formed by means of special moulding and machining processes. All metal parts can be of stainless steel, or special alloys, depending on the nature of the service conditions.

Interested Engineers are invited to send for illustrated literature describing the Type 109 Mechanical Shaft Seal.

This is one of the many mechanical shaft seals which we manufacture for a wide range of services. We manufacture this design of seal by agreement with the Crane Packing Co. of Chicago, U.S.A.

CRANE PACKING LIMITED, SLOUGH, BUCKS.

Monuments

TO SUN SHIP'S ACHIEVEMENTS IN BUILDING PRESSURE VESSELS.

SHIPBUILDING & DRY DOCK COMPANY

SINCE 1916

ON THE DELAWARE • CHESTER, PA.

25 BROADWAY • NEW YORK CITY

Matthew Hall & Co., Limited

The Twenty-Seventh Annual General Meeting of Matthew Hall & Co., Limited, was held on 5th May, 1954, at Matthew Hall House, Dorset Square, London.

Mr. Bertram Baden, M.C., S.B.St.J., M.I.H.V.E., the Chairman, presided.

The following is his statement which was circulated with the report and accounts:

It gives me pleasure to report that the progress of your Company has continued during 1953. The increase in the liquid resources of the Company is mainly due to the self financing nature of a large proportion of the work executed.

The Group Profit on Trading was £208,764 (1952—£201,567) and after deducting Directors' Remuneration, Bank Interest, Depreciation and Provision for Deferred Repairs there remains a Net Profit before Taxation of £133,662 (1952—£115,734).

The Parent Company has placed £20,000 (1952—£10,119) to General Reserve, bringing that Reserve up to £75,000, and the Directors recommended a dividend of 22½% against 20% last year. The amount carried forward in the Group Accounts is £122,868 (1952—£104,516).

AIR CONDITIONING DIVISION.—Air conditioning at home and overseas included installations for hospitals, schools, laboratories and for various industrial applications. Among the interesting contracts are those in connection with Emerald Beach Hotel in the Bahamas (this will be one of the most modern luxury hotels in the West Indies), a hospital in the Persian Gulf and the control tower at Jan Smuts Airport, Johannesburg.

ELECTRICAL. — Among our industrial contracts we are executing lighting and power installations for an I.C.I. Terylene plant and our electrical contract at the oil refinery which I mentioned last year continues.

In the Middle East we are installing electric lighting and power and street lighting for five schools, and for a technical college which has fourteen separate buildings.

We are also carrying out all the electrical services for the hospital in the Persian Gulf.

CHEMICAL, OIL REFINERY AND INDUSTRIAL ENGINEERING DIVISION. — We erected the first Platformer Unit to be built in Europe. This contract included the erection of heavy plant and vessels, pipework and instrumentation.

In Cyprus we welded and laid a submarine oil pipeline. The operation involved forming a channel by undersea blasting through rock conglomerate.

We are engaged on fabrication and erection of carbon and austenitic steel pipework for a Paraxylene plant.

Our instrumentation work for chemical and oil refinery plants has increased.

PLUMBING AND GARCHEY. — Among the plumbing contracts placed with us are the Haymarket House offices and a hotel in New Bond Street.

In the Middle East we are carrying out plumbing for schools, a technical college and also for the hospital in the Persian Gulf.

The Garchey System of domestic refuse disposal is being installed in eleven blocks of flats up to twelve storeys high in Birmingham.

MATTHEW HALL (PTY.) LTD., SOUTH AFRICA.—Work carried out by the Transvaal and Orange Free State factories of this Company included the manufacture of some miles of pipework up to 30 ins. in diameter.

The Chemical Engineering Division undertook homogeneous leadlining of saturators for the South African Coal, Oil and Gas Corporation Ltd. ("Oil from Coal"). Lead contracts included sulphuric acid plants for uranium projects for the leading mining companies.

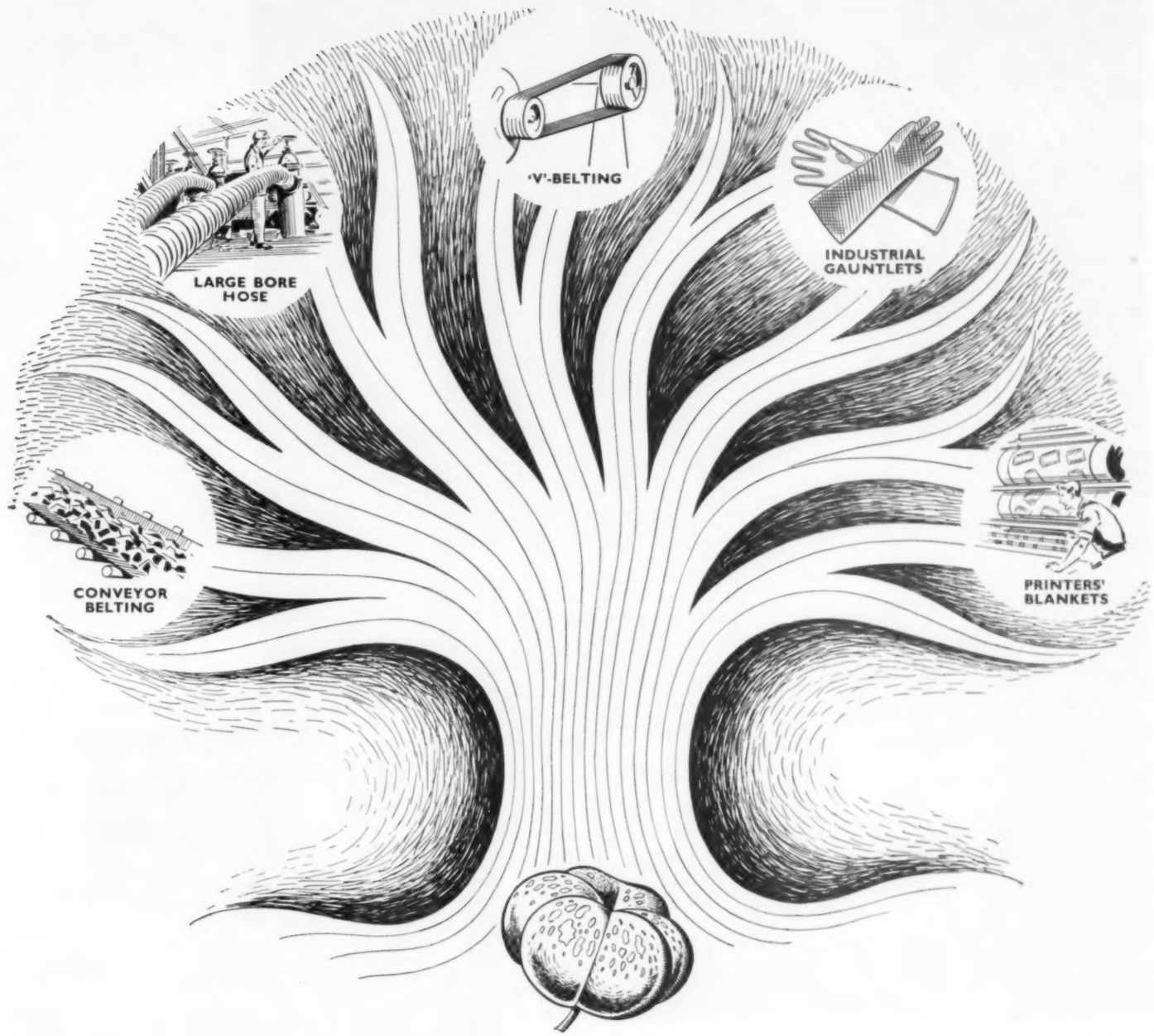
Contracts for air conditioning, heating, plumbing, electrical and automatic sprinkler installations have been executed.

SOUTHERN RHODESIA.—During the year our factory and offices were completed and the branch is making progress.

Our clients find it makes for economy and speed to place a contract with us for all services, such as air conditioning, heating, electrical and sanitation; it also avoids for them the necessity of organising and co-ordinating the activities of a number of subcontractors. We are executing an increasing number of such complete installations.

It gives me pleasure to express the thanks of the Board to our large staff and other employees at home and overseas, for the way in which they have so ably and enthusiastically carried out their duties during the year.

The report and accounts were adopted.



HEVEA BRASILIENSIS

This is the rubber tree of flourishing growth from the seed of which stem many fruits. Industrial gloves, conveyor belts for mines, flexible hose for refineries, hot water bottles, power transmission beltings and acid-proof linings — these and many others are the produce of Hevea Brasiliensis—yet the limit of the usefulness of the tree is not even in sight.

Since 1888 when the Dunlop Rubber Company was founded, rubber has come to equal coal and steel in importance to industry. Dunlop experience throughout these 65 years of development qualifies us to investigate and advise towards the solution of your problems. Please write to us . . . the obligation is on our side . . . to find the answer.

Rubber can do it—

DUNLOP *can show you how*

DUNLOP RUBBER CO. LTD., (G.R.G. DIVISION), CAMBRIDGE STREET, MANCHESTER, ENGLAND
CABLES: RUBBER, MANCHESTER
Depots & Distributors throughout the World

The Greater the Need for .....

Reliable Power

Illustration shows Meadows 6GJ630 natural gas engine in self contained power plant. Developing 96 B.H.P. at 1600 R.P.M., this power plant is suitable for direct-coupled or belt driven equipment. Similar units are offered for operating on diesel fuel or gasoline.

Meadows have a lifetime of experience behind them in providing reliable and economic power in far away places and under the most arduous conditions. As prime movers for oilfield equipment Meadows engines have been proved.

Manufacturers of natural gas, gasoline and diesel engines ranging from 30—300 B.H.P.

HENRY · MEADOWS · LIMITED

FALLINGS PARK · WOLVERHAMPTON · ENGLAND

Telephone: Wolverhampton 31921 Telegrams and Cables: OUTPUT, Wolverhampton

An Associated British Engineering Company

more speed... power... and capacity

with INTERNATIONAL 2-WHEEL RUBBER-TIRED TRACTORS, SCRAPERS, BOTTOM DUMP WAGONS

■ Here's the team that lets you do the job faster, better and more profitably. International's 2-wheel rubber-tired tractor with interchangeable scraper and bottom dump wagon will give you more speed and power, greater capacity and versatility.

Rugged design and dependable performance, coupled with the exclusive Hydro-steer for passenger-car maneuverability, makes these tractors unbeatable on the job. Powerful diesel engines provide highway speeds up to 25 mph. There is greater pull and more traction because 65% of the overall weight is on the drive wheels.

The easy-loading, high-speed scraper is designed for fast hauling . . . easy self-dumping. Open-top, twin-cable construction does away with cumbersome overhead structure.

Combination units available in two sizes—Model 2T-75 tractor (200 hp) with 18 yard heaped capacity scraper, and Model 2T-55 tractor (165 hp) with 13 yard heaped capacity scraper.

Your International Industrial Power Distributor offers a complete line of earth-moving equipment. He can recommend the right combination of units for your particular job—and back up the equipment with dependable IH service. International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill., U.S.A.

Full loads, high speed, quick turns are also features of International's extra heavy-duty bottom dump wagon. Doors open fast and clean with unit moving or standing. Doors always stay above hopper body level—prevents bogging down. Model 2W-75 wagon, 20 yard heaped capacity, available with 2T-75 tractor.

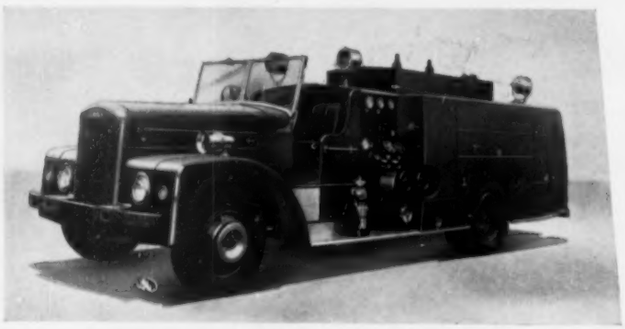
INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • BULLGRADERS • BULLDOZERS
LAND CLEARING BLADES • FOUR-WHEELED SCRAPERS • SKID SHOVELS
PAY LOADERS • PIPE BOOMS • POWER UNITS • GENERATORS

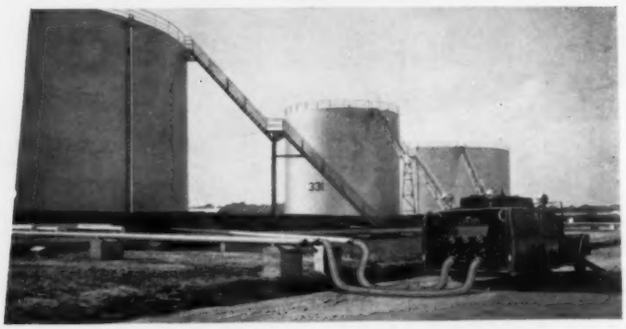
Pyrene TRADE MARK FIRE APPLIANCES

make every step in the Oil Industry a *Safer* step

SPECIALISED FIRE FIGHTING EQUIPMENT — FIRST AID, MOBILE, PORTABLE OR FIXED — PROTECTS REFINERIES, TANK FARMS, LABORATORIES, JETTIES, OFFICES AND MOTOR VEHICLES



A typical 'Pyrene' Mobile Foam Tender



A 'Pyrene' Foam Tender, shown connected to fixed foam risers

A 'Pyrene' Portable Telescopic Foam Tower

At every stage of refinery work there is need for fire protection. Consult The Pyrene Company . . . and obtain valuable impartial advice concerning a range of fire fighting equipment that is designed to meet the specialised needs of the Oil Industry, and covers every class of fire risk.

This comprehensive range includes 'Pyrene' Foam Fire Fighting Equipment embracing Mobile Foam CO_2 Tenders and Mobile Foam Trailers, Portable Foam Towers for applying foam to floating-roof tanks or to normal tanks with fractured roof plates, Foam Monitors of various types for jetty protection or for use in conjunction with Foam Tenders, and Fixed Foam Installations for bulk storage sites. These foam appliances incorporate 'Pyrene' Foam-making Branchpipes and Mechanical Foam Generators.

In addition there is a wide range of Hand Fire Extinguishers for all purposes, employing CO_2, Dry Chemical and 'Pyrene' Special Liquids, including Chlorobromomethane, as well as 'Conquest' Soda-Acid and Water-type Extinguishers, and 'Phomene' Foam Extinguishers.

The free and impartial advice of Pyrene Fire Engineers is always available to assist you with your fire problems, or illustrated literature will gladly be sent on request to Dept. W. P. 6.

THE PYRENE COMPANY LTD.

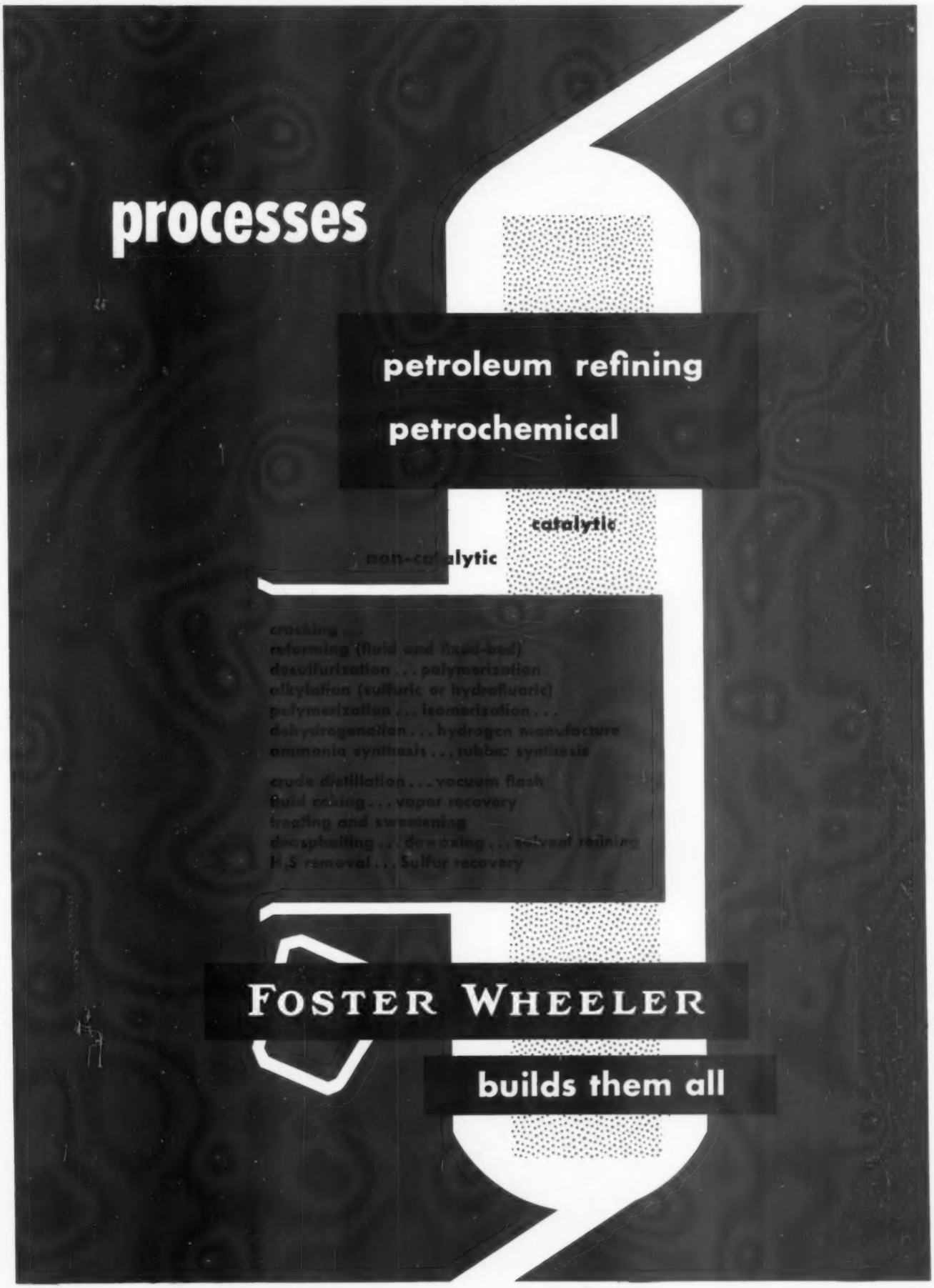
9 Grosvenor Gardens, London S.W.1

ENGLAND. Cables: "Pyrene London"

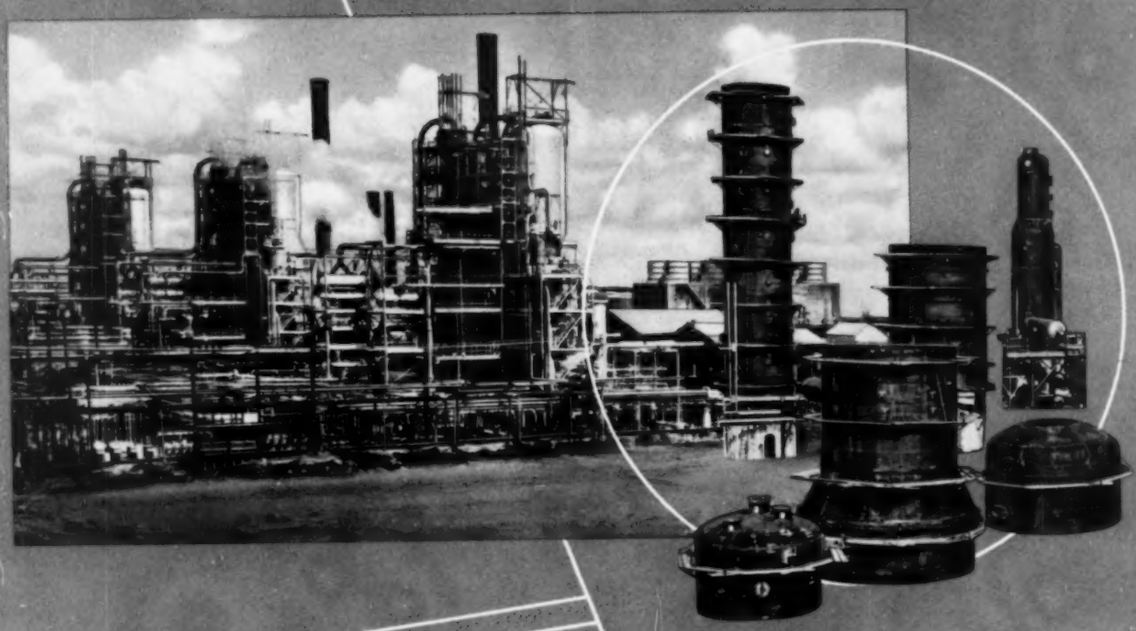
A 'Pyrene' Foam Monitor

A 'Pyrene' Foam-making Branchpipe and a 'Pyrene' Mechanical Foam Generator

'Pyrene' Pump-type, CO_2 and Dry Chemical Extinguishers, and 'Phomene' Chemical Foam Extinguisher


processes
petroleum refining
petrochemical
catalytic
non-catalytic
cracking . . .
reforming (fluid and fixed-bed)
desulfurization . . . polymerization
alkylation (sulfuric or hydrofluoric)
polymerization . . . isomerization . . .
dehydrogenation . . . hydrogen manufacture
ammonia synthesis . . . rubber synthesis
crude distillation . . . vacuum flash
fluid coking . . . vapor recovery
treating and sweetening
deasphalting . . . dewaxing . . . solvent refining
H2S removal . . . Sulfur recovery
FOSTER WHEELER
builds them all

three in line



one coming up

Over 300,000 barrels per day will be the capacity of this two-stage crude distillation battery when the fourth unit is placed "on stream".

Foster Wheeler designed and constructed all four units for this major Gulf Coast refiner.

For a general description of the flow of crude and products thru these units . . . write for HE-12-51.

FOSTER WHEELER

165 Broadway, New York 6, N. Y.

GULF SECURITY OIL

helps insure dependable performance of gas compressor units

Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF INDUSTRIAL LUBRICATION

..only part of the picture

OIL REFINERY ENGINEERS know that Newalls bring more than materials to the site, because they realise that even first class insulation materials cannot do justice to themselves unless they are efficiently applied. In fact, the task of planning that the right materials are used is a job studied carefully by Newalls before their recommendations are submitted. Through consultation with Newalls you can make very certain that method as well as materials is brought to bear on the problem. That's maybe why Newalls record of refinery insulation jobs makes such an impressive picture.

Where there's a HEAT INSULATION problem

there's a job for **Newalls**

NEWALLS INSULATION CO. LTD. *Head Office*, Washington, Co. Durham. *A member of the* TURNER & NEWALL ORGANISATION
Offices and Depots at LONDON, GLASGOW, MANCHESTER, NEWCASTLE UPON TYNE,
BIRMINGHAM, BELFAST, BRISTOL & CARDIFF. *Agents and Vendors in most markets abroad*

CATFORMING *means*

SIMPLICITY

for high octanes and high yields at low cost

Simplicity is the keystone of Catforming. Why? Because simplicity takes the high cost out of high octanes and high yields.

Simplicity speeds construction of Atlantic Catforming units—saving you money and time.

Simplicity makes operation of these units easy—saving you money on operating costs and manpower as well.

Simplicity means efficiency — Catforming cuts out intermediate steps in processing feed stocks, gives you high octane gasoline ready for immediate blending—and distribution.

Simplicity goes all the way with Catforming, including the licensing agreement—you'll find it well worth looking into. Remember, the performance of Catforming units has been proved in highly successful commercial operations in many areas. Write, wire or phone for detailed information — ask for our brochure, "CATFORMING." The Atlantic Refining Company, Research and Development Dept., P. O. Box 8138, Philadelphia 1, Pa.

ATLANTIC *It's the Catalyst that counts*

50 Watt VHF FIXED STATION

The new Pye 50 watt V.H.F. FIXED STATION is of an advanced design employing the latest techniques. It is ideal for use in normal fixed and mobile schemes where high powered transmitters are required and may also be used for point-to-point radio-telephone links. A further application is in the aeronautical band where the 50 watt transmitter, together with the standard Pye fixed receiver, provides one of the most efficient ground-to-air control stations at present available in the world.

Telecommunications

Pye (New Zealand), Ltd., P.O. Box 2839, Auckland C.1, New Zealand.

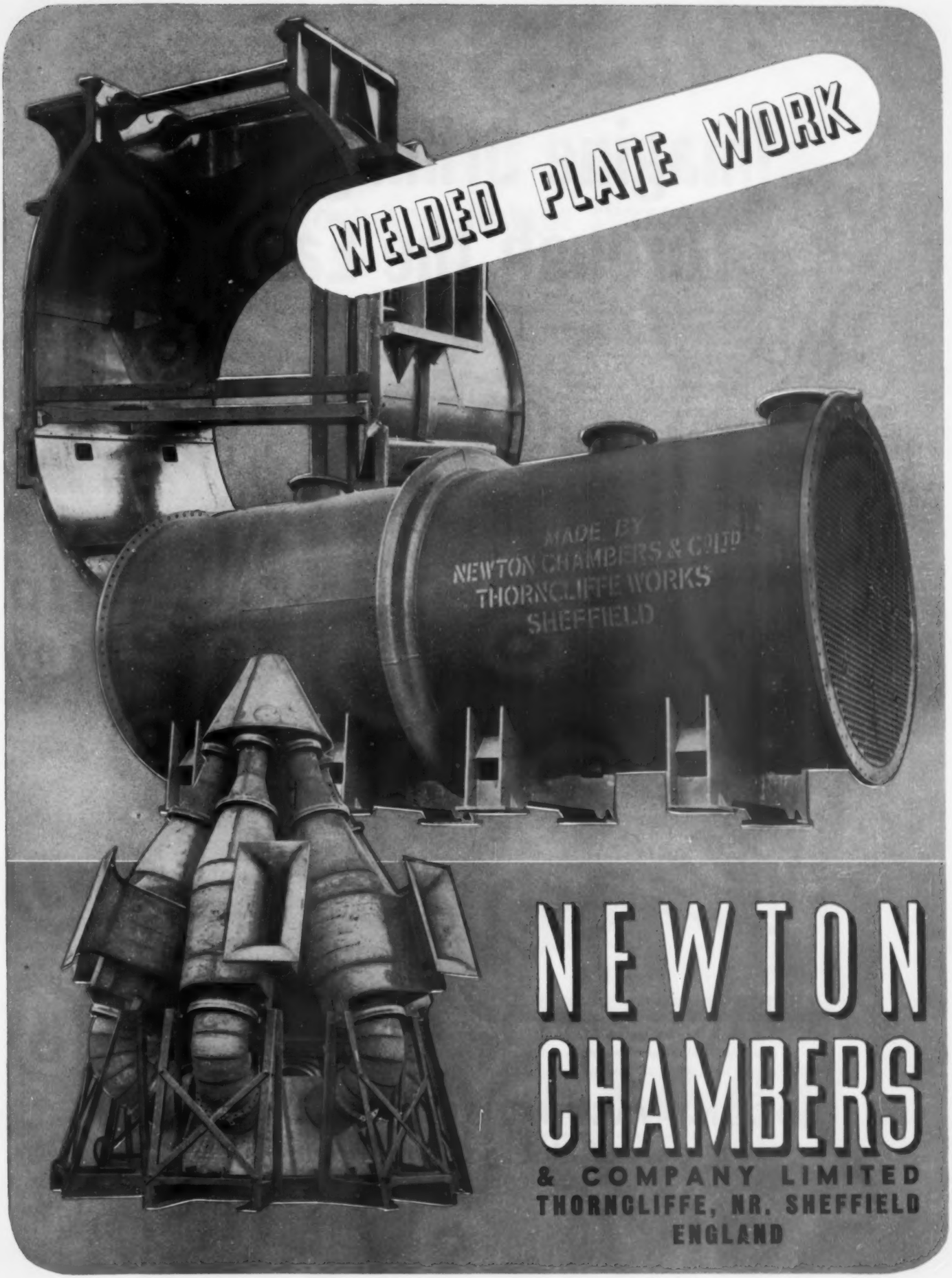
Pye Canada, Ltd., Ajax, Ontario, Canada.

Pye-Electronic Pty. Ltd., 65 Park Street, Abbotsford, Melbourne, Victoria, Australia.

Pye Ireland, Ltd., Manor Works, Dundrum, Dublin, Eire.

Pye Radio & Television (Pty.) Ltd., P.O. Box 10648, Johannesburg, South Africa.

PYE LIMITED • • CAMBRIDGE • • ENGLAND


WELDED PLATE WORK
MADE BY
NEWTON CHAMBERS & CO LTD
THORNCLIFFE WORKS
SHEFFIELD
NEWTON
CHAMBERS
& COMPANY LIMITED
THORNCLIFFE, NR. SHEFFIELD
ENGLAND

Imagine Drilling Clear Through the Earth!

IN THAT PERIOD Socony-Vacuum has produced in the United States alone more than 900,000,000 barrels of crude oil. Had we been content to rest on our oars, we would now be out of oil. Instead, during the years we drilled this great distance, we almost doubled Socony-Vacuum's domestic oil reserves which now stand at more than 1,650,000,000 barrels.

SOCONY-VACUUM

SOCONY-VACUUM OIL COMPANY, INC.

Makers of Mobilgas and Mobiloil

SET UP YOUR LOW-VOLTAGE SWITCHGEAR
from 10 basic units!

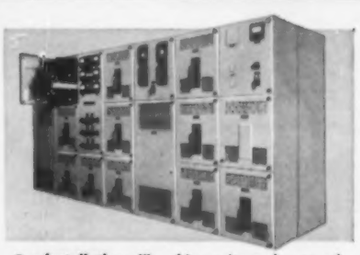
Remarkable flexibility is an outstanding advantage of Westinghouse "Unitized" Low-Voltage Switchgear.

"Unitized" design lets you plan your own switchgear set-up from 10 basic units . . . equipment can be arranged to meet any requirements for generator, incoming-line and feeder control up to 600 volts.

"Unitized" design virtually eliminates special design and engineering costs. Yet it meets specific application needs dictated by the number and ratings of circuits and offers a wide selection of instruments, relays and circuit-breaker attachments.

Completely metal-enclosed and self supporting, "Unitized" switchgear can be shipped as a single unit and put in service as soon as main cable and central connections have been made. The equipment is inherently dead-front . . . modern in construction and appearance. All circuit breakers can be moved to test position or removed completely for maintenance.

Westinghouse low-voltage switchgear for indoor or outdoor installations is designed for interrupting capacities from 15,000 amperes to 100,000 amperes, in continuous ratings from 15 to 6,000 amperes, for any ratings up to 600 volts.



For installations like this, write today to address below for free booklet B-5282 to determine your switchgear needs. Westinghouse engineers are also at your service.

YOU CAN BE **SURE** ...IF IT'S

Westinghouse

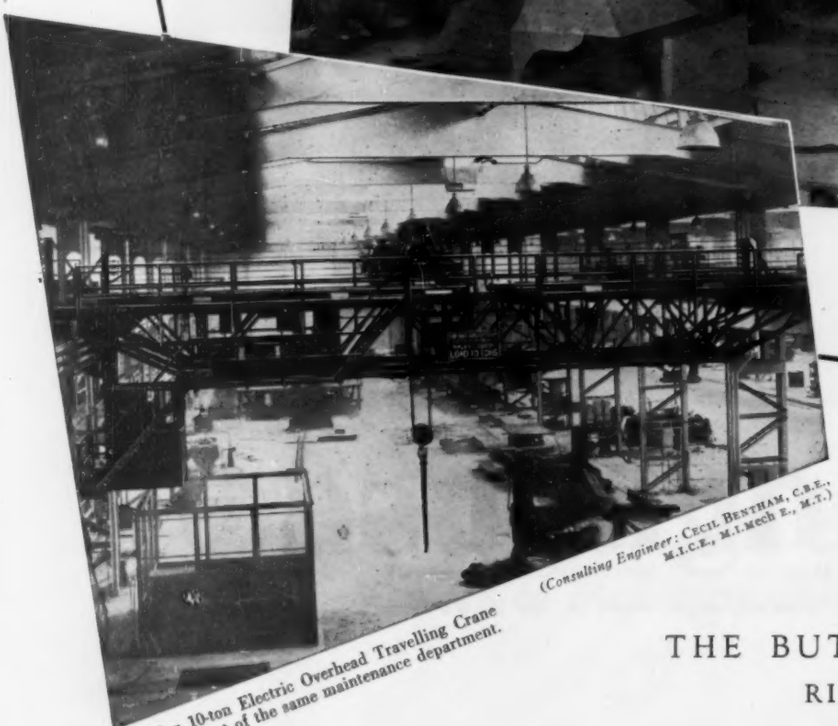
WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY

40 Wall Street, New York 5, U. S. A.

ELECTRIC OVERHEAD TRAVELLING CRANES

by BUTTERLEY

30 ton Butterley Electric Overhead Travelling Crane recently installed in the maintenance department of an important steel works.



Butterley 10-ton Electric Overhead Travelling Crane in another part of the same maintenance department.

(*Consulting Engineer*: CECIL BENTHAM, C.B.E., M.I.C.E., M.I.Mech.E., M.I.T.)

FOUNDED 1710

THE BUTTERLEY COMPANY LIMITED

RIPLEY · DERBY · ENGLAND

LONDON OFFICE: 20 ASHLEY PLACE • VICTORIA • S.W.I.

PETROLEUM CHEMICALS DIVISION
NEWS

June ★ One of a Series of Interest to the Petroleum Industry ★ 1954

A Dash of Color for Your Rail Sidings

Clean, brightly painted refineries, terminals, tank farms and service stations have become attractive additions to our industrial landscape.

Now the Du Pont Petroleum Chemicals Division is having its tetraethyl lead tank cars painted according to a new color scheme.

In the future, the top half of the cars will be a vivid yellow . . . the bottom half a rich green. The Du Pont ovals will be set off in red and white.

We think you'll find this new color combination pleasing, and our cars an attractive feature on your rail sidings.

Survey Findings on Gasoline Copper Content

Some highly interesting information was obtained in a recent Du Pont gasoline quality survey which included copper content analysis.

Of 241 service station samples from 44 U. S. and Canadian cities, 91% were found to contain copper in amounts from .01 to .90 mg/liter. Less than .01 mg/liter concentrations of copper can, in many cases, have an adverse effect on gasoline stability.

Where Does Copper Enter?

Even with stringent refinery control, gasoline often comes in contact with copper in the distribution system. Valves, pumps and other equipment are believed to be the source.

Gum Content

As part of the complete analysis, tests were made to determine gum content of the samples.

As you would suspect, gum concentrations were low in samples known to contain Metal Deactivator. In those with no deactivator, gum content was high. In some cases it appears that not enough deactivator is added to achieve maximum stability all along the line.

Du Pont Metal Deactivator minimizes the gum-forming action of copper. In most cases, it protects for less than 1/5 cent per barrel.

Any Du Pont Petroleum Chemicals Division regional office can give you added facts in connection with the gum problem.

These Services Can Help You Promote Employee Safety

As a refiner, you have a special safety problem due to the occupational hazards of handling tetraethyl lead.

To help you lick this problem as easily and efficiently as possible, the Du Pont Petroleum Chemicals Division makes a broad range of safety and medical services available to you. As an executive interested in and responsible for the safety of your workers, you will want to know how you can simplify your work by taking advantage of these important services.

INTEREST-AROUSING VISUAL AIDS are widely used by Du Pont representatives in safety talks and presentations.

Here are some of the ways in which these services can be valuable as a supplement to your own safety and medical programs.

Training Aid

As a training aid, the Du Pont Lead Hazard Clinic covers the broad psychology of industrial safety as well as *all* phases of safe TEL handling.

It is primarily designed as an educational tool and refresher course for supervisory personnel. It is also ideally suited for training members of crews concerned with TEL handling and with maintenance connected with leaded gasoline tanks.

To Keep Interest Lively

Workers easily become bored — and sometimes careless — when safety programs are presented over and over again in the same way.

To help refiners overcome this situation, Du Pont is constantly preparing new, interest-arousing visual aids. Your men will find them easy to under-

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED *Safety Services*

stand and remember. They are available in a variety of forms – including booklets, tip-overs and sound-slide films.

Advisory Service

Whenever it is necessary for cleaning or repair crews to enter a leaded tank, Du Pont will be glad to send a qualified representative to confer with the men on the safety procedures involved.

This service can be quickly obtained by telephone or telegraph and can be scheduled to fit in conveniently with your over-all operations.

For Authoritative Reference

The medical aspects of TEL handling fall into a highly specialized field.

Recognizing the need for an authoritative book on the subject, three Du Pont physicians recently wrote and published "Maintaining Hygiene in Tetraethyl Lead Operations." This book can be extremely helpful as a reference work and training aid for refinery doctors. Because of its specialized character, it is designed for limited distribution to physicians and management personnel only.

YOUR WORKERS get individual, personalized instruction from Du Pont safety representatives.

For Safety Meetings

Occasionally you may find it desirable to bring in outside speakers to discuss the safety and the medical aspects of TEL handling. For such meetings, or meetings involving other safety subjects, the safety and medical staffs of the Du Pont Petroleum Chemicals Division will be glad to send special representatives trained in public speaking. Their talks to employee groups are always penetrating and provocative.

Du Pont has also prepared a full-color Hollywood movie on tank truck operation and safety. This is an excellent tool for training drivers on their highway responsibilities. Unlike many commercial films, this one has plot, drama and humor that entertains while it trains.

In addition, Du Pont will be glad to help you solve any general safety problems individual to your refinery.

To put these important services to work, just get in touch with any Petroleum Chemicals Division representative or regional office.

ADDITIVES SALES COORDINATOR

WILLIAM T. ROBINSON is a special assistant to the sales manager of the Du Pont Petroleum Chemicals Division. In this capacity he coordinates sales of Du Pont Metal Deactivator, antioxidants, gasoline dyes, Fuel Oil Additive No. 2, "Ortholeum" 300 Grease Stabilizer and various other Du Pont additives. Prior to this assignment, he was employed in the Division's Technical Section.

After graduating from St. Vincent College in Latrobe, Pennsylvania, with a B. S. in Chemistry, Mr. Robinson became a laboratory chemist at the Texas Company. He then joined Universal Oil Products as a sales-service representative and came to the Du Pont Company in 1952.

During World War II he served in the Navy as commanding officer of a PT boat and later a minesweeper. He is a member of the American Chemical Society and a committee member in the Coordinating Research Council.

MOVIES AVAILABLE

You can easily obtain a wide selection of motion pictures from the Du Pont Petroleum Chemicals Division Film Library, free of charge.

Among them are many films specially tailored for oil company use in dealer meetings, public relations and employee training. A number of them are also ideal for showing to customer groups for sales purposes.

In addition to films on specific oil industry subjects, the Du Pont "Cavalcade of America" television program film library is available to you. These 26-minute sound movies about historical Americans are ideal for tying in with your own public relations showings at schools and service clubs, as well as for employee recreation.

FOR READY REFERENCE, this new catalog lists the films available to you through the Du Pont Petroleum Chemicals Division Film Library. Any of our regional offices will be glad to send you a copy.

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • *Wilmington 98, Delaware*

Regional Offices:
NEW YORK, N. Y.—1270 Ave. of the Americas . . Phone COlumbus 5-3620
CHICAGO, ILL.—8 So. Michigan Blvd. . . . . Phone RAndolph 6-8630
TULSA, OKLA.—1811 So. Baltimore Avenue . . . . . Phone Tulsa 5-5578
HOUSTON, TEXAS—705 Bank of Commerce Bldg. . . . . Phone PReston 2857
LOS ANGELES, CALIF.—612 So. Flower St. . . . . Phone MAdison 5-1691

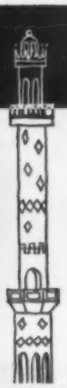
IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta.
OTHER COUNTRIES: Petroleum Chemicals Export—Nemours Bldg., 6539—Wilmington 98, Del.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-7431

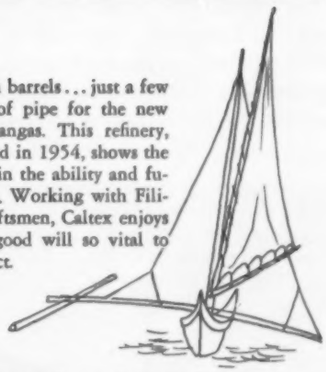
Printed in U. S. A.

NEW ZEALAND—Near majestic Mt. Egmont lies New Plymouth, largest city of Taranaki Province. This scenic land is the world's largest exporter of dairy products and lamb, ranks second in exports of wool. Caltex is proud to be a part of this scene . . . glad to help an enterprising country take its place in the modern world.



BAHRAIN—The contrast of old and new in this colorful shaikhdom is shown graphically here. The Bahraini's lateen-rigged dhow, Bahrain's traditional fishing and pearling craft, sails gracefully through the waters of the Persian Gulf. In the background we see a modern refinery and Sitra Wharf where tankers take on refined oil products for delivery to markets halfway 'round the world.

PHILIPPINES—Not gun barrels . . . just a few sections of the miles of pipe for the new Caltex refinery at Batangas. This refinery, which will be completed in 1954, shows the confidence of business in the ability and future of the Philippines. Working with Filipino engineers and craftsmen, Caltex enjoys the co-operation and good will so vital to such an immense project.



Caltex serves the people of 67 lands

In 67 lands, across half the world, through such developments as these, Caltex is able to supply better fuels and lubricants for industry, for agriculture, and for motoring millions. These require a continual investment of funds and skills, backed by a faith in a better future for free nations.

CALTEX

CALTEX Petroleum Products

SERVING EUROPE • AFRICA • ASIA • AUSTRALASIA

SEND IT *Written* OVER *Desk-Fax*

The New Method of Intercommunication!

This unique business aid changes the whole concept of office and industrial intercommunication. Now *written* messages can be transmitted electronically between any two locations connected by a telephone wire . . . in the same building . . . or miles apart! Just type, write, print or draw in pen or pencil on the sending blank, slip it around the cylinder and press a button. In two minutes the sending Desk-Fax produces an accurate facsimile of the message at the receiving Desk-Fax.

No other equipment is needed . . . each unit serves as transmitter and receiver. No operating noise . . . no special processing of message blanks. Sender keeps his original . . . addressee has a permanent facsimile for filing or rerouting. Desk-Fax, product of Creed & Company, Ltd., associate of International Telephone and Telegraph Corporation, illustrates ISE's policy of offering the most advanced, the finest products and equipment in every field of communications. Whatever *your* requirements in communications—look first to ISE!

FACTORIES IN SOUTH AMERICA: Cia. Standard Elec. Argentina, S. A. Ind. y Com., Buenos Aires, Argentina • Standard Electrica, S. A., Rio de Janeiro and São Paulo, Brazil • Cia. Standard Electric, S.A.C., Santiago, Chile.

ISE — an IT&T Associate

International Standard Electric Corporation

67 Broad Street, New York 4, N. Y., U.S.A.

Central telephone exchange equipment for installations of any size, automatic or manual.

Radio aids to air navigation . . . complete airport communications and lighting equipment.

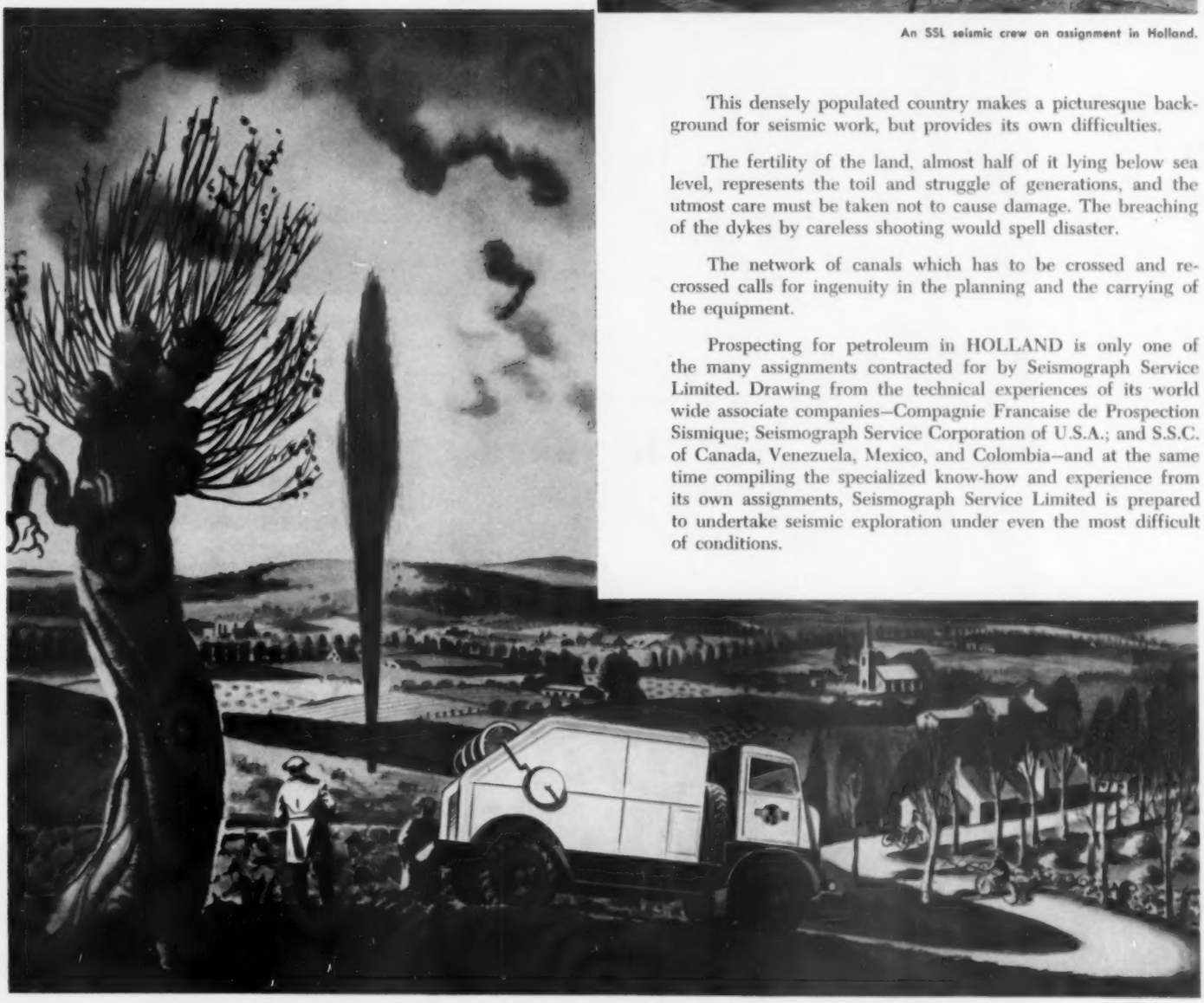
Microwave communications systems and equipment for pipelines, utilities, railroads, telephony, aviation.

Cable, power tubes, conduits, transformers—equipment for every electric power need.

All equipment for television and radio broadcasting and receiving, point-to-point communication.

OIL
MUST BE DISCOVERED

An SSL seismic crew on assignment in Holland.



This densely populated country makes a picturesque background for seismic work, but provides its own difficulties.

The fertility of the land, almost half of it lying below sea level, represents the toil and struggle of generations, and the utmost care must be taken not to cause damage. The breaching of the dykes by careless shooting would spell disaster.

The network of canals which has to be crossed and recrossed calls for ingenuity in the planning and the carrying of the equipment.

Prospecting for petroleum in HOLLAND is only one of the many assignments contracted for by Seismograph Service Limited. Drawing from the technical experiences of its world wide associate companies—Compagnie Francaise de Prospection Sismique; Seismograph Service Corporation of U.S.A.; and S.S.C. of Canada, Venezuela, Mexico, and Colombia—and at the same time compiling the specialized know-how and experience from its own assignments, Seismograph Service Limited is prepared to undertake seismic exploration under even the most difficult of conditions.

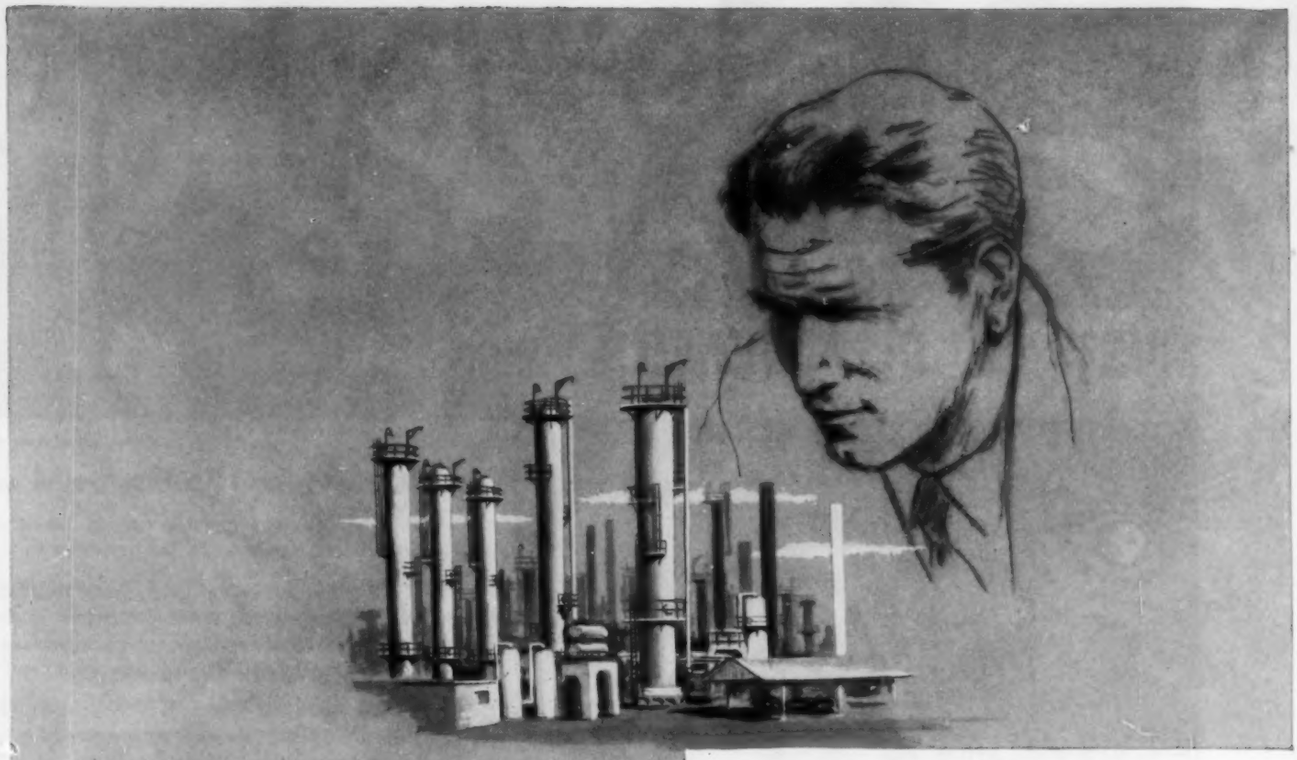
Seismograph Service Limited

CABLE ADDRESS:
"SEISLIM, LONDON"

INLAND TELEGRAPHIC ADDRESS:
"SEISLIM, BROMLEY"

"HOLWOOD," KESTON, KENT, ENGLAND

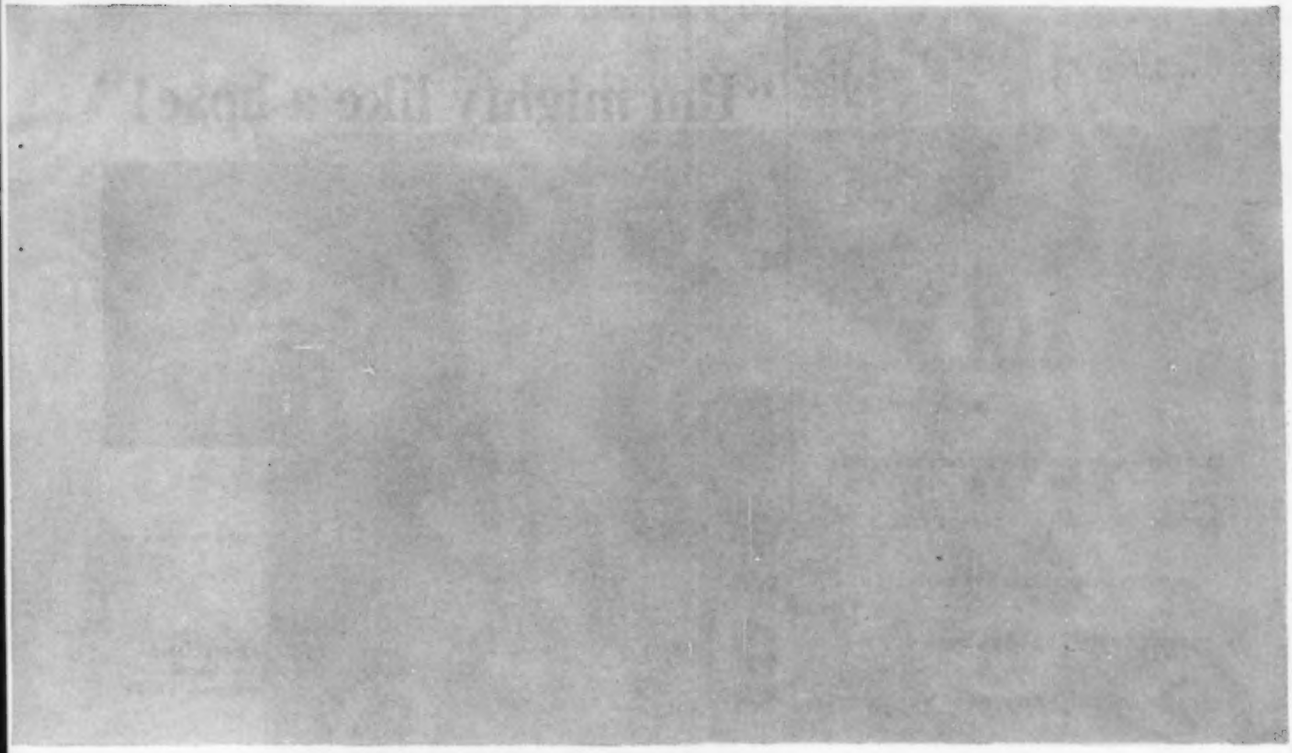
SUBSIDIARY OF SEISMOGRAPH SERVICE CORPORATION, TULSA, OKLAHOMA, U. S. A.



interest that can't be taxed

Here is interest on which there are no taxes . . . the interest that each Universal licensee can count upon from an organization whose entire resources and collective efforts are directed toward helping the petroleum refiner conduct his refining operations on a profitable basis.

Year in and year out, our research, development, and engineering staffs are constantly at work seeking out new approaches to the complex problems of refining . . . putting



every ounce of energy into the job of finding how some method or technique can be profitably applied to give the refiner more value for each dollar invested in processing equipment, operation, and plant maintenance.

In the interest of the refiner, Universal will continue to bring forth new methods and new techniques. Important contributions will be made toward the progress and success of those refiners availing themselves of the broad benefits derived from the application of thorough knowledge and wide practical experience in the petroleum refining field.

Interest in your business, on the part of those who serve you, is your best assurance of a satisfactory relationship. To best serve you, it is fundamental that we interest ourselves in your problems. That is Interest That Can't Be Taxed . . . the kind of interest you have every right to expect from a company whose own interests are partial to none—available to all.

UNIVERSAL OIL PRODUCTS COMPANY

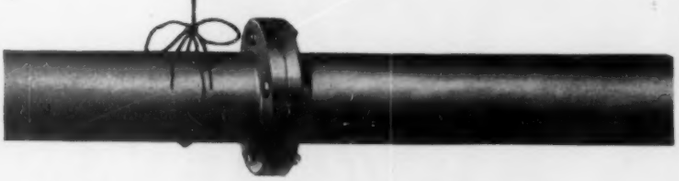
30 ALGONQUIN ROAD, DES PLAINES, ILL., U. S. A.
Laboratories: RIVERSIDE, ILLINOIS

Universal Service Protects Your Investment

Do it properly!

with pre-engineered suspension

Improvised suspension methods are rarely satisfactory—often not even safe. Vokes Genspring Suspension Systems offer dependable control of all stresses due to pipe movement, by means of Variable Support Hangers, for vibration and limited vertical travel, or by Constant Support Hangers when *complete* control is an essential. Illustrated literature on both types of suspension systems will be supplied on request.



VOKES GENSPRING

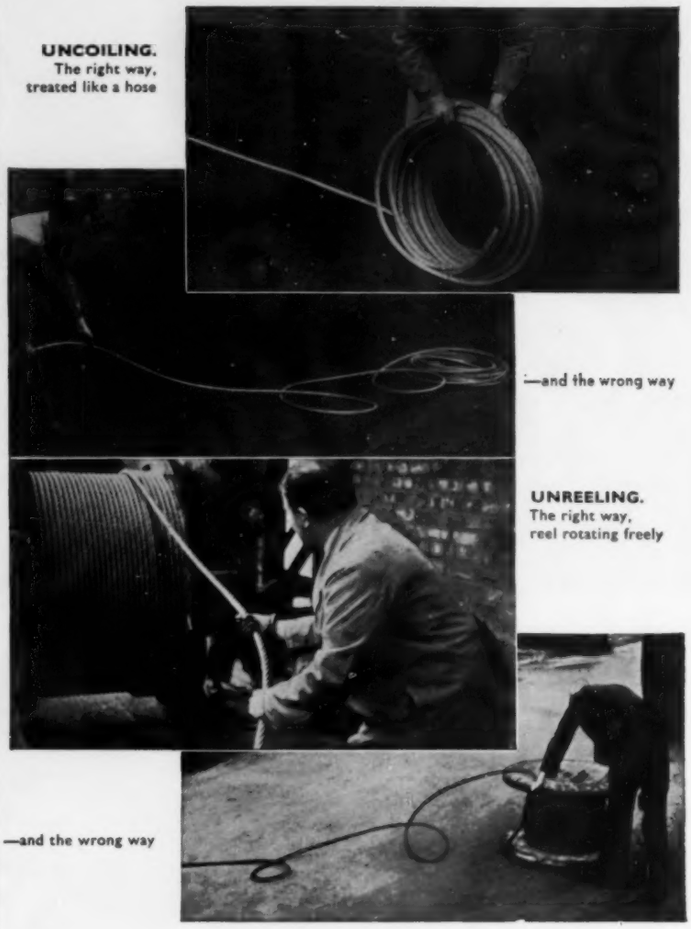
SUSPENSION SYSTEMS

Dept. S, Vokes Genspring Ltd., Guildford, Surrey

V99

IF ROPE COULD TALK . . .

"I'm mighty like a hose!"



UNCOILING. The right way, treated like a hose

—and the wrong way

UNREELING. The right way, reel rotating freely

—and the wrong way

Good rope repays care in handling. Never allow kinks to form when UNCOILING or UNREELING a steel wire rope. Treat it like a hose pipe. A light coil of rope may be unrolled along the ground but should always be kept under control. A reel may be placed on a turn-table or mounted on stands and supported by a bar or tube through the hole in its centre. In no case should a coil or reel be laid on the ground and the end taken over; kinks will inevitably form and the rope's life and efficiency be seriously reduced. When COILING down a rope always put in under-turns as required to counteract the tendency of the rope to twist itself. Under-turning is simple — the rope itself will indicate that.

Write for a copy of a new booklet "If Rope could Talk".

British Ropes Limited

HEAD OFFICE : DONCASTER. EXPORT SALES OFFICE : 52 HIGH HOLBORN, LONDON, W.C.1.

KNOWLEDGE
a power for good

The Standard-Vacuum organization is continually expanding its educational and training programs for its 40,000 employees in the various areas where it operates.

In Indonesia, for example, 71 formal training courses as well as on-the-job instruction are giving several thousand men new skills . . . teaching them to work as a team and to produce more . . . improving their ability to shoulder responsibility . . . adding to their economic security as individuals and their economic strength as citizens.

Stanvac seeks to do its part in developing the capacities of its employees so that they become better qualified to carry on the company's operations and to participate in supervisory and administrative functions.

Greater knowledge is truly a power for good.

STANDARD-VACUUM OIL COMPANY

A name that stands for "Progress" in the East

26 BROADWAY, NEW YORK 4, N.Y.

AUSTRALIA • BURMA • CEYLON • HONG KONG • INDIA • INDO-CHINA • INDONESIA • JAPAN • KENYA • MADAGASCAR
MALAYA • NEW ZEALAND • PAKISTAN • PHILIPPINES • PORTUGUESE EAST AFRICA • RHODESIA • SINGAPORE
SOUTH PACIFIC ISLANDS • SOUTH WEST AFRICA • TANGANYIKA • THAILAND • UNION OF SOUTH AFRICA

LUMMUS COKING UNITS
give top performance for
Pan-Am Southern

Lummus has built two delayed coking units for Pan-Am Southern Corporation in the past few years, one at El Dorado, Arkansas, and the other at Destrehan, Lousiana... and Pan-Am Southern is well satisfied with them.

The El Dorado unit, despite a 42 day steel strike during the construction period, was completed ahead of the specified date, and for less than the guaranteed maximum cost. It was designed to charge 9,300 B/D of reduced crudes, but since coming on-stream, the daily rate has averaged 10% above the designed capacity. The unit went on-stream immediately and operated 181 out of the first 199 days after completion (a 91% service factor). In the first half of 1953, it achieved and has since averaged a 97% service factor (224 day run, 6 day down-time). On-stream maintenance and repair costs are correspondingly low.

Gas oil from the coker (53% yield of reduced crude charge) is used for catalytic cracking charge stock where its low Conradson carbon allows it to be processed without penalty. Yield structure compares favorably with that obtained from catalytic cracking of virgin gas oil. The coke produced in the process is of sufficiently high quality for use in the manufacture of electrodes for aluminum production.

The new (and similar) Destrehan installation is achieving equally satisfactory records.

Lummus engineers have done an outstanding job for Pan-Am Southern. Why not consult with Lummus on *your* next coking project?

THE LUMMUS COMPANY, 385 Madison Avenue, New York 17, New York. *Engineering and Sales Offices:* New York, Houston, Montreal, London, Paris. *Sales Offices:* Chicago, Caracas. *Heat Exchanger Plant:* Honesdale, Pa. *Fabricated Piping Plant:* East Chicago, Indiana.

LUMMUS

DESIGNING ENGINEERS AND CONSTRUCTORS FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

VOL. 25, NO. 6, JUNE 1954

World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

FOUNDED BY RUSSELL PALMER

MONA PALMER, Publisher

E. W. MAYO, Editor

J. C. CHATFIELD, Managing Editor

E. W. MAYO, JR., Sales Manager

W. E. ANDERSON, Associate Editor

J. R. TISSAVARY, Art Director

Member Of National Business Publications, Inc., and Business Publications Audit of Circulation, Inc.

SUBSCRIPTIONS

Annual subscription $5.00 (U.S.) postpaid
Single copies $1.00

GENERAL OFFICES

604 Fifth Avenue, New York 20
(Tel. JUdson 6-4820)

BRANCH OFFICES

LONDON, ENGLAND

G. L. Fetherstonhaugh, St. Paul's Corner, Ludgate Hill, London E.C. 4
(Tel. CITY 5318)

HANNOVER-S, GERMANY

Kurt Buge
Annenstrasse 11
(Tel. 8-4179)

LOS ANGELES 43

Justin Hannon
4068 Crenshaw Blvd.
(Tel. AXminster 2-9501)

NEW YORK 20

Sales Representatives:
E. L. Townsend, R. K. McQuiston
604 Fifth Avenue
(Tel JUdson 6-4820)

TULSA 3

O. F. Cozier, Mid-Continent Advertising Manager, 305 Daniel Bldg.
(Tel. 4-5555)

DALLAS 1

World Petroleum Statistical Yearbook
H. J. Struth, Editor
626 Reserve Loan Life Bldg.
(RAndolph 5515)

World Petroleum is published by Mona Palmer, Trustee under the will of Russell Palmer.

CONTENTS

7 Washington Pipe Line: Northwestern States Gas Supply Question Approaching Decision, by Joseph B. Huttlinger

39 Higher Earnings, Record Investment

40 Dedicate Durban Refinery

43 World Congress Adopts Program

44 Era of Supertankers Sustains Shipbuilding Activity, by E. Lawson Lomax

49 Japan Building Tankers for Export, by Stuart Griffin

50 Navy Advocates U. S. Tanker Building

51 Oil Company Income Reaches New High in 1953

54 Geelong Refinery Operating

56 Recent Trends in Canadian Drilling Practices, by A. S. Murray

60 Dualayer Gasoline Treating Process, by C. A. Duval and V. A Kalichevsky

65 Chile's Growing Petroleum Industry, by Dr. J. E. Rassmuss

66 Geograph Provides New Exploration Technique

68 More Power, Style in 1954 Autos

72 New Patents on Light Distillate Additives, by Heinz Heinemann and Felix Heinemann

75 Lahee Report Shows 13,313 Exploratory Wells Drilled in U. S. in 1953

78 International News & Notes

82 British Oil News

84 Oil Company Staff Changes

92 Advertisers' Index

THIS MONTH'S COVER

Well being drilled near Neches, Texas in the Gulf Coastal region by J. C. Means, Beaumont drilling contractor. The rig is an Ideco Full View Mast. Photograph is by Robert Yarnall Richie, and is reproduced through the courtesy of Dresser Industries, Inc.

MORE ROOM FOR IMPROVEMENT

HALLIBURTON'S ELECTRONIC LABORATORY . . . HOUSTON

Bricks... and steel... and modern design make a handsome superstructure. But behind the walls, inside the doors, there lies the reservoir. For there is stored the rich know-why of thirty years' research. And the vast know-how of two-million-job experience. Research is the dominant factor in every new development. Halliburton believes that its thirty years of research is a good running start. And has provided research with a larger starting place in this new Technical Center. The greatest skills of Engineering, Metallurgy, Chemistry, and Electronics are here combined with greater physical facilities; such as test wells, instruments, and most advanced laboratory equipment. Providing more room for improvement is the surest promise we can make that Halliburton's research will continue its energetic pace. This is the responsibility of leadership, fully accepted in its field by Halliburton.

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

Higher Earnings, Record Investment

IN THE fourth month of 1954 a noteworthy change began to make itself felt in the economic atmosphere of the United States. The professional forecasters who had painted a dismal prospect for the coming year took a second look at their curves and charts and began to speak of a gradual adjustment instead of depression, recession and financial disaster. In this they were somewhat behind the investors of the country who had been demonstrating their faith in the nation's resourcefulness for six months before by purchasing securities at a rate that had brought about a steady rise in industrial shares, raising the index more than 20 percent above its level in last September. They were also far behind the business leaders of the country, who moved steadily ahead on programs of new construction, expansion and research to meet the rising demands of a nation that adds two million new consumers to its population every year.

A survey made by the *Wall Street Journal* covering 338 companies in 22 industries revealed net income during the first quarter of 1954 as 36 million dollars, or 3.23 percent higher than in the corresponding period of the preceding year. Not all companies made gains; in fact there were wide divergences. Two hundred and ninety-one industrial companies increased their net income by 70 million dollars, though some in this group experienced declines, the heaviest being among farm equipment manufacturers, coal producers, distillers, and iron, steel and metal companies.

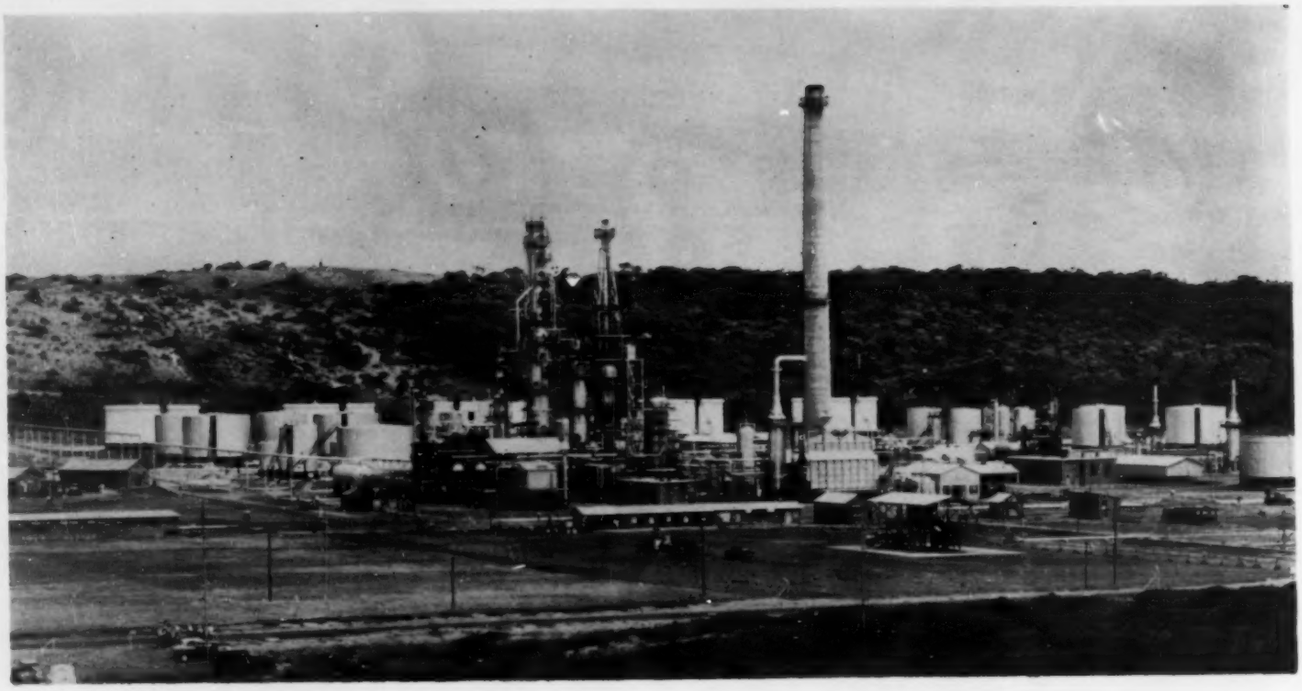
Certain industries slumped seriously, railroad earnings being down 45 percent and textiles 59 percent, while others suffered in lesser degree. This seems to confirm the opinion of those who have insisted that business has been undergoing an adjustment rather than being sunk in depression. Petroleum occupies a medial position among the concerns studied, 13 companies included in the survey showing first quarter income of 23.5 million dollars or 15.4 percent higher than in the first three months of 1953.

Actually, the showing of the oil industry appears to be rather better than this figure indicates. Reports of 30 companies gathered by WORLD PETROLEUM and shown in the financial review appearing on other pages of this issue places the net income of these corporations at $551,327,000 as compared with $479,073,000 in the first quarter of 1953, an increase of 15.1 percent. It is significant, too, that many companies reporting less than normal income in the early months of the current year were experiencing a gain in business activity during April and May, giving hope that second quarter results would compare favorably with the high record for the same period of 1953.

Strong testimony of the confidence of the managements of petroleum companies in the economic future of their industry was provided in the report submitted by President Frank M. Porter to the directors of the American Petroleum Institute at the end of April as a result of the Institute's biennial survey of petroleum capital expenditure programs. This review, based on appropriations already made or authorized, shows that the investment being made in 1954 for the expansion and improvement of the industry's resources and facilities will reach the stupendous total of more than 4,600,000,000 dollars, or 6.2 percent higher than the previous peak total of 1953. Emphasizing that this enormous capital expenditure represents only a one-year segment of the industry's growth, President Porter pointed out that it signalized "in addition to oil's expression of faith in the future, that petroleum companies recognize and are discharging their responsibilities with traditional foresight and are keeping themselves geared and prepared for peace or war."

As a sidelight to the report, it is pointed out that the capital investment in the country's oil industry has doubled since 1945, amounting this year to more than 28 billion dollars.

Of the amount scheduled for capital investment in the current year, about four billion dollars is to be expended in the United States, with something over 600 million to be invested abroad. The latter figure relates only to investment by consolidated subsidiaries and takes no account of the thousands of millions being expended by the many companies operating wholly in the international field. Reports from ten such companies show projected expenditures above a billion dollars.



Dedicate Durban refinery

Facing page: South Africa's first major fuel products refinery, located at Durban, Natal, as seen from Marine Drive.

The two large tanks in the foreground were especially built for crude oil storage at the Island View Terminal.

SOUTH AFRICA'S first major fuel products refinery, formally dedicated at Durban, Natal on May 11, is the first of three major additions to Standard-Vacuum Oil Company's refining capacity in the Eastern Hemisphere, an expansion program which will nearly double that company's 1952 crude oil throughput by mid-1955.

The company has under construction another new refinery at Bombay, and the capacity of its Altona plant near Melbourne is being expanded eleven-fold. The Bombay plant is scheduled to go on stream in July and the Melbourne facilities will be completed early next year.

In addition, substantial changes toward greater throughput are being made at the Wakayama and Shimizu refineries of Toa Nenryo Kogyo KK, a Japanese oil refining company in which Standard-Vacuum acquired an interest after the war.

South Africa's demand for petroleum products has almost doubled since World War II and continues to climb annually at a four to five percent rate. Nearly all of its oil products have been imported in the past.

The Durban refinery is able to supply approximately one-fifth, or 180 million Imperial gallons, of the oil products currently consumed in the Union of South Africa. It is easily accessible to the Union's largest center of population, the Johannesburg area, and is convenient to principal coastal distribution points.

Based on a crude rate of 15,600 barrels a day, a capacity which was quickly reached without major difficulties when the plant was placed on stream in early January, the Durban refinery yields about 5,800 barrels of motor gasoline per day, 1,500 barrels of power kerosine, 800 barrels each of lighting kerosine and industrial diesel oil, 900 barrels of automotive diesel oil, 100 barrels of marine diesel, 3,700 barrels of fuel oil and 400 barrels of asphalt.

The Durban plant, built at a cost of $25 million, is one of the world's first refineries to use a "combination unit" design which integrates the relatively new Model IV fluid catalytic cracking unit with atmospheric crude distillation and thermal reforming facilities. In this respect, it is similar to the recently completed refinery at Antwerp and to Stanvac's new Bombay plant.

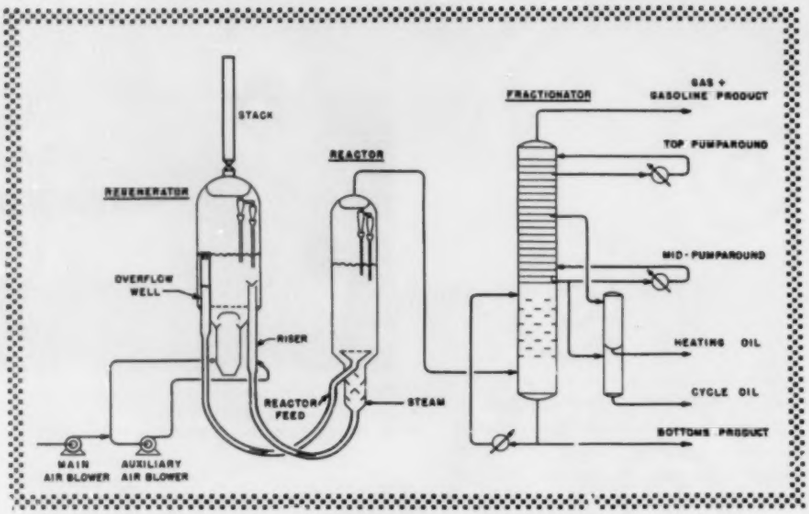
The refinery will make efficient use of Persian Gulf crude oil which is well-suited to combination unit operations. The plant design also allows sufficient flexibility of operation to meet possible fluctuations in product demand. It is economical in terms of the efficient use of personnel. From a construction standpoint it calls for fewer tanks, less steel and shorter pipe lines, which in turn mean savings in the cost of off-site equipment.

Crude oil in the combination unit design flows first to the crude pipe still where four cuts are taken: light naphtha overhead, heavy naphtha or kerosine distillate, gas oil and bottoms. The light naphtha is stabilized and sent to doctor sweetening. While part of the heavy naphtha goes to finishing operations for the production of power kerosine, the bulk of this cut serves as feed for the thermal reforming furnace.

Reformer furnace products are fractionated, the major product being high-octane thermal-reformed gasoline which is stabilized and then doctor treated. When

Air photo of Island View Terminal, which is used by all petroleum importers for this area of South Africa.

Facing page: The 26,500-ton Stanvac South Africa enters Durban harbor with the first consignment of crude oil for Standard-Vacuum's Durban refinery.



Simplified flow diagram of new Model IV fluid catalytic cracking unit at the Durban refinery.

a kerosine distillate is made, it is processed through SO_2 extraction plant for the production of illuminating kerosine.

The third cut from the pipe still, gas oil, serves primarily for the production of automotive diesel oils, although some of this stream is used as fluxing stock for fuel oils. Some also may be used as feed for the catalytic cracker. The bottoms, containing all the heavy fractions of the crude, are fractionated to obtain catalytic cracking feed, while some of the higher boiling point bottoms are used as feed to the asphalt plant. The catalytical-gasoline, distillate and fuel oil components as well as feed for recycling.

ly-cracked products are fractionated into

The remaining processes in the refinery are essentially standard. All the gasoline components, after being stabilized, undergo doctor sweetening before the addition of tetraethyl lead, dye and inhibitor.

The SO_2 extraction unit contains complete facilities for treating the illuminating kerosine cut which then is finished by caustic washing, doctor sweetening and filtration.

Power kerosine quality also is controlled by doctor sweetening and filtration. The light cycle gas oil from the catalytic cracker is sent through a caustic wash and is blended into diesel oils and heavy fuel oils.

Besides the asphalt plant, which is designed to produce either cutback or oxidized asphalts, Durban's auxiliary equipment includes a grease plant and manufacturing facilities for the production of five gallon cans. Field work is well advanced on a non-selective polymerization plant scheduled to begin operations before the end of the year.

Built for Standard-Vacuum Refining Company of South Africa (Pty.) Ltd., Stanvac's new manufacturing subsidiary, by Foster Wheeler Ltd., the main contractor, the plant went on stream promptly on schedule. This was possible despite a shortage of skilled welders and other oil industry craftsmen who had to be trained as construction progressed.

Actual construction started in February 1952 following preliminary surveys and acquisition of the 285-acre site. The first crude was run by the refinery on January 2, 1954.

The refinery is approximately 4½ miles from the deep water crude discharging facilities at Island View on the Bay of Natal, where Stanvac's marketing subsidiary, Vacuum Oil Company of South Africa (Pty.) Ltd., has operated a petroleum products importing terminal for many years.

This installation has been enlarged to accommodate the imported crude which is pumped by 10-inch pipe line to the refinery. One eight-inch and two four- inch product lines were installed at the same time for the delivery of finished products to tankers handling coastwise distribution.

The Island View docks can accommodate the large new super tankers with a draft of approximately 40 feet. Crude is pumped by 20- to 24-inch lines to two large storage tanks adjoining the terminal, moving thence by the smaller pipe line to the refinery.

Stanvac also has installed a 6-inch, 1,050-foot underwater products line across the harbor entrance to an existing ships' bunkering dock. This eliminated a long land haul around the harbor.

Apart from increased tax revenues and savings in foreign exchange for the Union of South Africa, Standard-Vacuum's investment at Durban means year-around employment for a staff of more than 400 residents of that country, the introduction of a new industry and the development of new skills. It also opens up the possibility of additional industries' developing nearby to utilize the by-products of petroleum refining.

Eric H. Louw, the Union's Minister of Economic Affairs, officially dedicated the new plant at the May 11 ceremonies which were attended by oil company executives from the United States as well as other governmental, civic and industrial representatives in the Durban area.

Asphalt manufacturing facilities, peak capacity 25,000 long tons of paving and cut-back asphalts annually, were included in the new Durban refinery.

World Congress adopts program

THE GENERAL ORGANIZING COMMITTEE of the Fourth World Petroleum Congress, under the chairmanship of Prof. Marcello Boldrini, has worked out the main features of the 1955 meeting of the Congress and has adopted a provisional program for its proceedings.

The Congress will meet in Rome from June 6 to June 15, 1955. The plenary sessions and the meetings of the various sections will be held in the Congress building of the Rome Universal Exhibition Center (EUR). Registration of delegates and members will take place there on Saturday, Sunday and Monday, June 4, 5 and 6. The inaugural session of the Congress will be held at the Capitoline Palace at 5 PM Monday, June 6, following a luncheon for committee members and official delegates at the Excelsior Hotel. A cocktail party will follow the inaugural session. Sectional meetings will begin on Tuesday, June 7. The first of the plenary sessions will take place in the afternoon of that day and in the evening there will be a concert at the Basilica di Massenzio.

Wednesday, June 8, will be devoted to sectional meetings with the second plenary session at 5 PM. An official dinner will take place at the Hotel Excelsior and in the late evening there will be a theatrical performance and dancing.

Thursday, June 9, will be a holiday in Italy and consequently there will be no formal meetings, but the day will be given over to sightseeing tours with the opera in the evening.

The following day, June 10, will be taken up with sectional meetings and a plenary session at 5 PM. Saturday and Sunday, June 11 and 12, will be given over to sightseeing tours to points of historic interest and to industrial plants.

On Monday, June 13, sectional meetings will be resumed and for the evening a sightseeing tour, "Rome by Night," is planned.

Tuesday and Wednesday, June 14 and 15, will be occupied by sectional meetings with the third plenary session Tuesday afternoon and the final meeting of the Congress on the following day.

Aside from the regular business of the Congress, a number of special events are planned. A request will be presented to the Pope for an audience for participants in the Congress and it is hoped that the President of the Republic will receive a group of the delegates. The possibility of organizing an exhibit of petroleum and of the equipment used in the industry is under consideration.

Following the meetings to be held in Rome, a number of tours to other Italian cities and to industrial areas will be available to those attending the Congress. The extent of these and the places to be visited will depend upon the preference expressed by visitors.

Nine sections will be formed to hear and discuss papers on various phases of petroleum operations with subjects and subdivisions as follows:

Section I—Geology and Geophysics
- A) Regional geology of oil.
  - 1) America.
  - 2) Europe.
  - 3) Middle Europe.
  - 4) Africa.
- B) Geology of reservoirs.
- C) Origin and accumulation of oil.
- D) Paleontology and ecology.
- E) Geophysics.

Section II—Drilling and Production
- A) Drilling fluids.
- B) Well Completion.
- C) Drilling techniques.
- D) Bore hole surveys.
- E) Primary production.
- F) Secondary production.
- G) Material problems.

Section III—Oil Processing
- A) General problems.
- B) Physical operations in oil processing.
- C) Desulfurization.
- D) Catalytic reforming.
- E) Catalytic cracking.
- F) Thermal conversion of heavy residuum.
- G) Various chemical operations in oil processing.
- I) Atmosphere and water pollution by refinery wastes.
- H) A symposium on shale oil.

Section IV—Production of Chemicals from Petroleum: Properties and Application
- A) Production and utilization of olefins.
- B) Oxidation of hydrocarbons.
- C) Various developments.

View of the Congress building, Rome Universal Exhibition Center, site of the Fourth World Petroleum Congress in June 1955.

Section V—Composition of Petroleum: Analysis and Testing; Measurement and Control
- A) Petroleum composition and properties.
- B) Sampling and analysis.
- C) Apparatus and methods of instrumental analysis.
- D) Correlation between physico-chemical properties and composition of petroleum products.
- E) Analysis of impurities and trace constituents.

Section VI—Utilization of Oil Products
- A) Asphalts and bitumens.
- B) Waxes and paraffins.
- C) Lubricants.
- D) Heavy Fuels.
- E) Fuels and combustion in diesel engines.
- F) Fuels and combustion in spark ignition engines.
- G) LP Gas.
- H) Uses of petroleum products in gas industry.

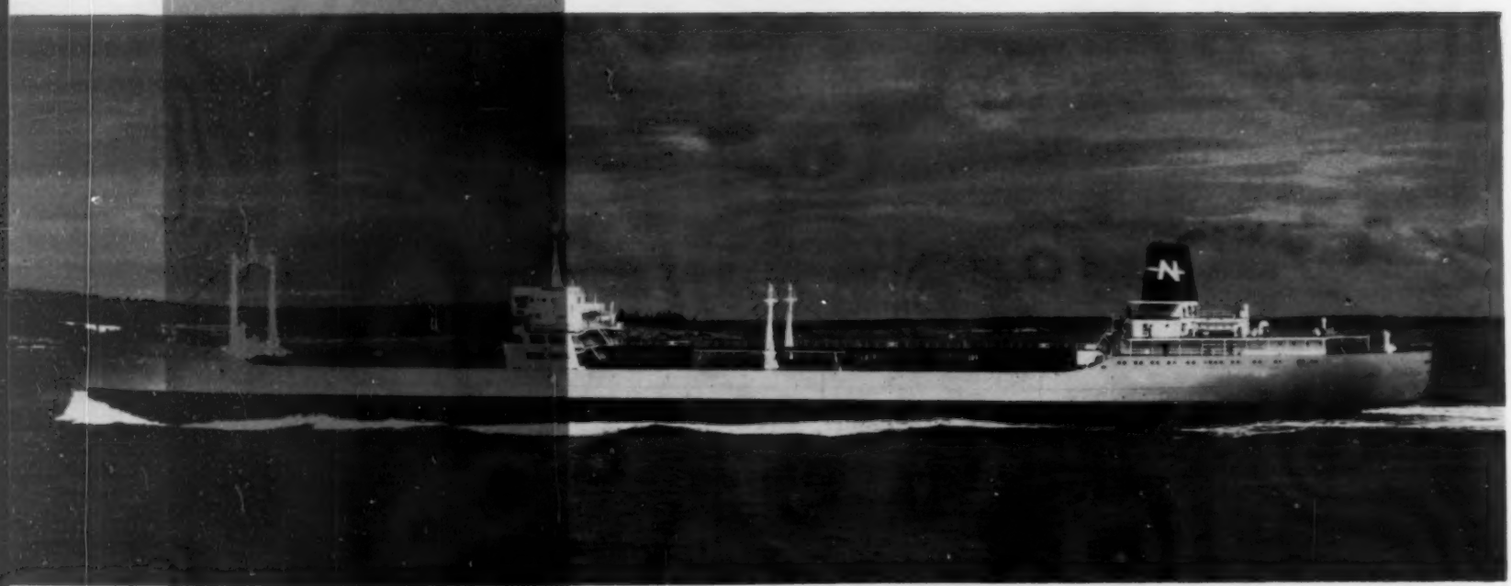
Section VII—Construction of Equipment, Materials, Corrosion
- A) Petroleum refinery engineering.
- B) Construction materials.
- C) Corrosion and protection of equipment.

Section VIII—Transport, Storage and Distribution
- A) General.
- B) Transportation by tankers.
- C) Pipelines and pipeline terminals.

Section IX—Economics, Statistics, Education and Training
- A) Terminology and standardization.
- B) Training and management.
- C) Technical aspects of economic problems.

Interior view of the Congress hall at the Rome Universal Exhibition Center, where Congress meetings will be held.

Era of SUPERTANKERS sustains shipbuilding activity



The 45,150-ton tanker S. S. World Glory, the world's largest, on her delivery trial.

By E. Lawson Lomax

DURING THE PAST DECADE there have been revolutionary changes in the pattern of the world tanker fleet affecting the number of ships, their distribution, speed and tonnage, and also in the quality of their equipment and appointments. At the close of World War II the vast emergency building program of the United States, undertaken to meet the needs of a titanic struggle waged on opposite sides of the globe, had placed the nation in possession of more than half of the total surviving tonnage. In this array of roundly a thousand ships, a large proportion was government built and government owned, turned out by mass production methods to a uniform size and specification. This was the celebrated T2-SE-A1 class, so preponderant in numbers that for some years all tankers were rated as equivalents of T2's.

As time went on, members of this wartime fleet were dispersed or placed in reserve. The advantages of larger vessels for long sea voyages led the American government to foster the construction of larger craft built with public aid and classed as special naval reserves for use in the event of another emergency. They were of 27-28,000-ton rating.

Another factor influencing tanker construction was the development of prolific oil production in South America, the Middle East and the Far East, opening the field for big fast carriers to move oil from these fields to world markets. Combined with the swift rise in the demand for petroleum products, this ushered in the era of the supertanker so that now the appearance of oil carriers of 30,000 tons or more deadweight capacity is no novelty and the 40,000-ton mark is being surpassed by oil ships that rival the largest ocean passenger liners.

A recent report of Lloyd's Register stated that tankers now represent 23.5

percent of the world's merchant shipping with a total of 29,963,397 deadweight tons at the end of 1953, an increase of 1,974,771 tons over the year preceding.

While the number of tankers under construction or on contract at the end of the year showed a decrease of about 20 percent from the previous year's figures, and if launchings during 1954 are at no higher rate than during last year, when the largest annual tonnage ever recorded was launched from world shipyards (amounting to 2,862,369 gross tons, equivalent to over 4½ million deadweight tons), yet there is still building in hand sufficient to keep these yards occupied over 3½ years, even should no further orders be placed.

At the end of 1952, there were 730 tankers on order or building, while at the end of 1953 the number had been reduced to 587. During the year, 273 tankers were launched, 78 from British Commonwealth shipyards, 23 from United States yards, 144 from continental yards and 23 from Japanese yards. It would appear, therefore, that during 1953 only 130 new tankers were ordered. This slowing down of orders is causing some concern among British shipbuilders, who in the past years have had full order books for this class of shipping, and is causing them to consider carefully the rising building costs. They point out to the unions concerned with shipbuilding and engineering, who are making demands for increased wages, that they would be serving their own interests by dropping or deferring these demands in order that full work and full pay packets may be preserved for the workers. At the same time a director of one of the large shipbuilding companies warns that antiquated methods of building will have to be dropped by the shipyards and modern equipment installed if British builders are to retain their lead in this important industry.

The trend toward greater transport capacity is indicated by the growing number of tankers of over 30,000 tons deadweight ordered or under construction, there being 100 in this group of which 35 are allocated to British yards and 65 to American and continental builders. Six ships of over 44,000 tons are on order, two in the United Kingdom, three from firms on the European continent and one in the United States. Three of these have been launched during recent months, one American, another, the "Tina Onassis," from a continental yard, and the third in Japan.

Most of the vessels over 30,000 tons are steam-turbine propelled, but 15 are diesel engined, two built in Britain, seven in Norway and six in Sweden.

In Lloyd's annual summary of ships launched during 1953, it is mentioned that 20 ships of over 20,000 tons gross were launched from world shipyards during the year, of which 16, or 80 percent, were tankers, the remaining four being passenger liners.

The following table is a short resume of the tankers on order or under construction in 1953 and 1954:

	1952	(DWT)	1953-4	(DWT)
Diesel	365	6,716,290	288	5,222,700
Turbine	326	8,152,955	281	8,075,200
Turbo-Electric	5	99,400	4	72,000
Gas Turbine	—	—	1	18,000
Steam (reciprocating)	14	86,870	13	159,800
	730	15,055,515	587	13,547,800

VESSEL TYPE	AVERAGE SIZE	
	1952	1953
All vessels	20,620	23,150
Diesel vessels	18,400	18,135
Turbine & Turbo-electric	24,900	28,580

It will be seen from these figures that there is practically no change in the average size of tankers with diesel propulsion, even though 15 such vessels of over 30,000 dwt are on order, but there is a large increase in the average size of turbine and turbo-electric vessels.

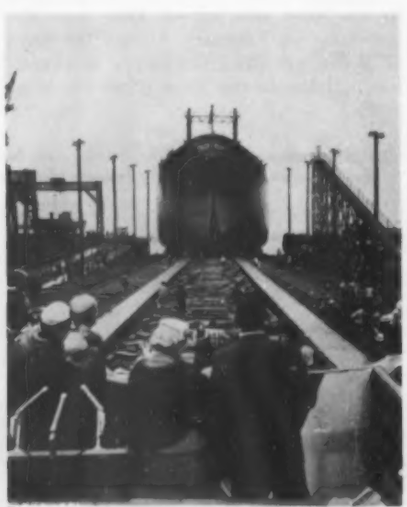
In 1951 practically twice as many diesel-engined tankers as turbine-driven vessels were on order or building; the ratio was less in 1952, but in 1953 the numbers are practically equal, while the deadweight tonnage has completely reversed. It would appear, therefore, that builders and owners are agreed that turbine drive for the super-tankers is more practical and probably cheaper all 'round than diesel propulsion.

Doubts have been expressed in some quarters as to the advantages gained in the construction of super-tankers, mainly due to the fact that their operations are restricted to voyages between ports where there is sufficient depth of water at all states of the tide for their berthing, but if the view is taken that they will be engaged on specialty work, carrying one grade of oil and plying between deep water ports, that they are in fact floating pipe lines, and also that their running and maintenance costs per unit of oil transported are less than those of the average sized tanker, then their construction would appear to be amply justified.

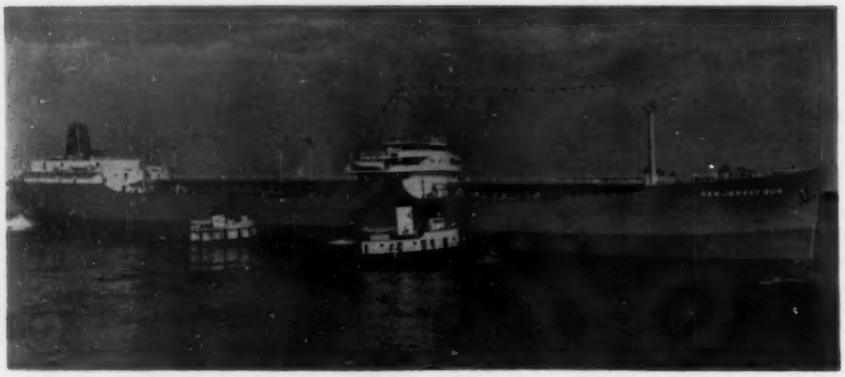
In 1952, the deadweight tonnage of tankers on order or building was shared to the extent of about 28 percent by vari-

Cities Service' 38,000-ton supertanker W. Alton Jones just before her launching April 20.

The British Tanker Company's British Merchant discharges 28,800 tons of Kuwait crude at the Kent refinery.



The S. S. Flying-A-Delaware, new 27,000-ton addition to the Tide Water fleet, slides down the ways.



The New Jersey Sun, 30,200 dwt steam turbine tanker built for Sun Oil Co. by Sun Shipbuilding & Dry Dock.

ous oil companies and 72 percent by independent operators. In 1953, with a smaller number of vessels on the order books, the ratios were 23 percent oil companies and 77 percent independents, so it would appear that the carriage of petroleum as a business separate from the oil industry itself is becoming recognized and accepted by the shipping industry.

A large amount of oil companies' capital is locked up in tankers, and if the tendency toward independent tanker operation persists, it will enable the oil companies to direct a greater percentage of their capital to searching for further sources of supply of crude and its subsequent winning and refining, thus enabling the industry to cope with the steady yearly increase in demand for its products.

The increases in dwt and speed of tankers, together with their rapid rates of loading and discharge, enables the newer vessels to be run more economically and has considerably relieved the shortage of tankers which was prevalent a few years ago. One result is evident in the reduction that has taken place in tanker rates.

A notable event in American shipping in the first quarter of 1954 was the launching on February 9 from the ways of Bethlehem Steel Company's shipbuilding division in the Fore River yards at Quincy, Mass. of the world's largest tanker. This is the "World Glory," built by Bethlehem for Stavros Niarchos and his associates. The vessel is 718 feet in length at the water line (705 feet between perpendiculars), beam 102 feet, molded depth 50 feet. Her deadweight is 45,150 tons, her draft when loaded is 37 feet 6½ inches, and her cargo capacity is 390,000 barrels with an estimated weight of 41,300 long tons. One full cargo of this giant carrier would equal the entire daily production of many active oil fields.

To accommodate her normal cargo, the "World Glory" is equipped with 33 cargo tanks, with 11 midship tanks measuring 40 feet long by 45 feet wide by 50 feet deep, and 22 wing tanks, all but two 40 feet long by 30 feet wide by 50 feet deep. Cargo handling facilities include four main cargo pumps, horizontal-centrifugal type, each with a discharge rate of 750 long tons per hour against 125 lbs/square inch total head, plus four smaller cargo stripping pumps, vertical duplex double acting type, each with a discharge rate of 107 long tons per hour against 125 lbs/square inch gauge discharge pressure.

Driving power is provided by oil-burning, high-pressure, high-temperature steam turbines delivering, by double reduction to 100 spar, 15,000 horsepower at shaft, driving a single bronze propeller (5 bladed, 22½ feet in diameter, weighing 70,000 lbs), said to be the heaviest ever cast in a single piece for a cargo vessel. Designed speed is in excess of 16 knots, with estimated normal speed of 15¾ knots.

Other noteworthy launchings from American yards during the early months of the current year include the "W. Alton Jones," named for the chairman of Cities Service Oil Co. and christened by Mrs. W. Alton Jones at the yards of Newport News Shipbuilding and Dry Dock Co., Newport News, Virginia on April 20. This 38,000-ton vessel is the first of four sister ships being constructed for Cities Service and Grande Bassa Tankers, Inc. at Newport News. They are 707 feet in length with a beam of 93 feet, a loaded draft of 36½ feet and a designed speed of 17½ knots.

A group of four large tankers are under construction at Newport News for Tide Water Associated Oil Co. The first of these was launched in February last. Each is 628 feet in length with a draft of 32 feet, a deadweight of 27,000 tons and a speed of 17 knots.

At Chester, Pennsylvania, Sun Shipbuilding and Dry Dock Co. is building two tankers of 30,206 tons deadweight for Sun Oil Co. which will be the latest and largest additions to the company's extensive ocean fleet.

A tanker notable not for its size, but for the service in which it is employed, is the "Marine Dow Chem" built by Bethlehem Steel Co. at Quincy, Mass. which began operation in April 1954. It is the first tanker of large size constructed in the United States for carrying liquid chemicals in bulk. It is equipped with six tanks with a capacity of 240,000 gallons lined with a rubber compound which enables it to transport hydrochloric acid and caustic solutions alternately. The vessel is owned by Marine Transport Lines, Inc. and is under charter to Dow Chemical Co. for transport of its products.

Bethlehem Steel Co. led the way among American builders of tankers in 1953 with four vessels aggregating 117,453 deadweight tons at Quincy and eight built by Bethlehem Shipbuilding Co. at Sparrows Point, Maryland with a tonnage of 192,136. Newport News Shipbuilding and Dry Dock Co. contributed six with 137,605 tons and Sun Shipbuilding and Dry Dock Co. four with 107,546 tons.

Tankers under contract at American yards on January 1, 1954 included eleven to be built at the Sparrows Point yards of Bethlehem and eight at Fore River with an aggregate of 527,371 deadweight tons. Eight tankers were on order at Newport News and five at the Sun Shipbuilding and Dry Dock yards at Chester, Pennsylvania. The 32 vessels scheduled for the current year with an aggregate of 884,363 deadweight tons represent a gain of 45 percent in number and 57.5 percent in tonnage over 1953.

The supertanker World Unity, 30,000 dwt, berthed at Genoa, Italy. In the foreground is a floating fence which encloses the waters of the oil dock.

ANALYSIS OF TANKERS UNDER CONSTRUCTION IN SHIPYARDS OF THE WORLD DECEMBER 31, 1953

BRITISH SHIPYARDS	NO. OF TANKERS BUILDING	GROSS TONS	D.W.T.	DIESEL	DIESEL ELEC-	TURBINE	TURBO-ELECTRIC	RECIPROCATING STEAM	NO.	BRITISH OWNERS T.G.	BRITISH OWNERS D.W.T.	NO.	FOREIGN OWNERS T.G.	FOREIGN OWNERS D.W.T.	NO.	OIL COMPANIES D.W.T.	OIL COMPANIES T.G.	NO.	INDEPENDENTS D.W.T.	INDEPENDENTS T.G.
Barclay, Curle & Co.	2	—	33,000	2	—	—	—	—	—	—	—	2	—	33,000	—	—	—	2	—	33,000
Bartram & Sons, Ltd., South Docks, Sunderland	1	—	16,500	1	—	—	—	—	1	—	16,500	—	—	—	—	—	—	1	—	16,500
Blythe Dry Docks & Shipbuilding Co. Ltd., Blythe	3	—	54,000	3	—	—	—	—	1	—	18,000	2	—	36,000	—	—	—	3	—	54,000
Blytheswood Shipbuilding Co. Ltd., Scotstoun	8	91,800	—	5	—	2	—	1	4	45,800	—	4	46,000	—	2	20,900	—	6	70,900	—
John Brown & Co. (Clydebank) Ltd.	8	—	237,500	—	—	8	—	—	4	—	122,500	4	—	115,000	4	—	122,500	4	—	115,000
Caledon Shipbuilding & Eng. Co. Ltd., Dundee	2	22,660	—	2	—	—	—	—	1	9,160	—	1	13,500	—	—	—	—	2	22,660	—
Cammell, Laird & Co. Ltd., Birkenhead	15	—	345,000	1	—	13	Gas T 1	—	15	—	345,000	—	—	—	14	—	327,000	1	—	18,000
Charles Connell & Co. Ltd., Scotstoun	5	—	90,000	5	—	—	—	—	1	—	18,000	4	—	72,000	—	—	—	5	—	90,000
John Crown & Co. Ltd., Sunderland	1	—	18,000	1	—	—	—	—	—	—	—	1	—	18,000	—	—	—	1	—	18,000
William Doxford & Sons, Ltd., Pallion, Sunderland	3	—	54,000	3	—	—	—	—	1	—	18,000	2	—	36,000	—	—	—	3	—	54,000
Fairfield Shipbuilding & Eng. Co. Ltd., Govan	2	—	34,000	2	—	—	—	—	1	—	16,000	1	—	18,000	—	—	—	2	—	34,000
Furness Shipbuilding Co. Ltd., Haverton Hill-on-Tees	33	—	776,500	13	—	20	—	—	22	—	519,300	11	—	257,200	1	—	16,500	32	—	760,000
William Gray & Co. Ltd., West Hartlepool	1	—	3,150	—	—	—	—	1	1	—	3,150	—	—	—	—	—	—	1	—	3,150
Greenock Dockyard Co. Ltd., Greenock	1	—	16,300	1	—	—	—	—	1	—	16,300	—	—	—	—	—	—	1	—	16,300
William Hamilton & Co. Ltd., Port Glasgow	7	—	113,500	7	—	—	—	—	2	—	32,000	5	—	81,500	1	—	16,000	6	—	97,500
Harland & Wolff Ltd., Belfast	15	—	319,600	6	—	9	—	—	9	—	220,000	6	—	99,600	8	—	194,000	7	—	125,600
Harland & Wolff, Ltd., Govan	4	—	65,500	3	—	1	—	—	2	—	28,000	2	—	37,500	2	—	28,000	2	—	37,500
R. & W. Hawthorn, Leslie & Co. Ltd., Hebburn	14	—	287,600	3	—	11	—	—	14	—	287,600	—	—	—	8	—	184,000	6	—	103,600
Sir Jas. Laing & Sons Ltd., Sunderland	9	—	173,300	8	—	1	—	—	6	—	110,900	3	—	62,400	1	—	16,000	8	—	157,300
Lithgows Ltd., Port Glasgow	12	—	203,500	7	—	5	—	—	7	—	114,500	5	—	89,000	5	—	88,000	7	—	115,500
Scotts Shipbuilding & Eng. Co. Ltd., Greenock	6	—	98,260	5	—	1	—	—	4	—	64,260	2	—	34,000	—	—	—	6	—	98,260
Smith's Dock Co. Ltd., South Bank	12	—	185,200	5	—	7	—	—	8	—	142,500	4	—	42,700	7	—	126,000	5	—	59,200
Swan, Hunter & Wigham Richardson, Wallsend-on-Tyne	9	—	223,600	2	—	6	1	—	7	—	174,000	2	—	49,600	6	—	148,000	3	—	75,600
Swan, Hunter & Wigham Richardson, Neptune Works, Newcastle	4	—	68,100	4	—	—	—	—	2	—	32,000	2	—	36,100	1	—	16,000	3	—	52,100
Joseph L. Thompson & Son Ltd., Sunderland	11	—	208,450	8	—	3	—	—	8	—	154,450	3	—	54,000	4	—	68,000	7	—	140,450
John I. Thornycroft & Co. Ltd., Southampton	1	—	6,000	1	—	—	—	—	—	—	—	1	—	6,000	—	—	—	1	—	6,000
Vickers Armstrong Ltd., Barrow-in-Furness	11	—	323,200	1	—	10	—	—	11	—	323,200	—	—	—	9	—	235,200	2	—	88,000
Vickers Armstrong Ltd., Walker-on-Tyne	8	—	241,330	2	—	6	—	—	3	—	88,330	5	—	153,000	2	—	56,030	6	—	185,300
TOTAL	208	114,460	4,195,090	101	—	103	2	2	136	54,960	2,864,490	72	59,500	1,330,600	75	20,900	1,647,230	133	93,560	2,553,860
CONTINENTAL SHIPYARDS																				
BELGIUM																				
Jos. Boel & Fils, S.A. Tamise	4	52,000	—	4	—	—	—	—	—	—	—	4	52,000	—	1	13,000	—	3	39,000	—
Soc. Anon. John Cockerill, Hoboken	11	—	234,550	4	—	7	—	—	—	—	—	11	—	234,550	6	—	142,050	5	—	92,500
TOTAL	15	52,000	234,550	8	—	7	—	—	—	—	—	15	52,000	234,550	7	13,000	142,050	8	39,000	92,500
DENMARK																				
Burmeister & Wain, Copenhagen	4	—	54,300	4	—	—	—	—	—	—	—	4	—	54,300	—	—	—	4	—	54,300
Odense Staalskibsvaerft A/S., Odense	6	61,000	18,000	5	—	1	—	—	1	—	18,000	5	61,000	—	1	—	18,000	5	61,000	—
TOTAL	10	61,000	72,300	9	—	1	—	—	1	—	18,000	9	61,000	54,300	1	—	18,000	9	61,000	54,300
FRANCE																				
Chantiers Navals De La Ciotat, La Ciotat (B.D.R.)	5	—	126,500	2	—	3	—	—	1	—	18,000	4	—	108,500	2	—	36,000	3	—	90,500
Ateliers & Chantiers De France, Dunkerque	7	—	211,700	—	—	6	1	—	—	—	—	7	—	211,700	—	—	—	7	—	211,700
Ateliers & Chantiers De La Loire, Paris	2	—	57,750	1	—	1	—	—	—	—	—	2	—	57,750	1	—	36,250	1	—	21,500
Ateliers Et Chantiers De La Seine Maritime, Le Trait	4	—	77,000	1	—	3	—	—	—	—	—	4	—	77,000	—	—	—	4	—	77,000
Chantier De St. Nazaire Penhoet, St. Nazaire	12	—	359,850	2	—	10	—	—	—	—	—	12	—	359,850	5	—	151,000	7	—	208,850
TOTAL	30	—	832,800	6	—	23	1	—	1	—	18,000	29	—	814,800	8	—	223,250	22	—	609,550
GERMANY																				
Bremer, Vulkan Schiffbau & Maschinenfabrik, Bremen-Vegesack	5	31,400	36,770	3	—	—	—	2	—	—	—	5	31,400	36,770	1	—	16,450	4	31,400	20,320
Deutsche Werft, Hamburg	20	—	424,510	12	—	8	—	—	2	—	30,400	18	—	394,110	9	—	207,300	11	—	217,210
Howaldtswerke A.G., Hamburg	4	—	154,500	—	—	4	—	—	—	—	—	4	—	154,500	—	—	—	4	—	154,500
Kieler Howaldtswerke A.G. Kiel	16	—	392,600	2	—	14	—	—	—	—	—	16	—	392,600	—	—	—	16	—	392,600
Lubecker Flender-Werke A.G. Lubeck	1	—	16,000	1	—	—	—	—	—	—	—	1	—	16,000	—	—	—	1	—	16,000
Nordseewerke Emden G.M.B.H., Emden	5	—	98,400	4	—	1	—	Unaflow —	1	—	28,600	4	—	69,800	—	—	—	5	—	98,400
A.G. "Weser," Bremen	12	—	245,550	—	—	11	—	1	—	—	—	12	—	245,550	1	—	12,750	11	—	232,800
TOTAL	63	31,400	1,368,330	22	—	38	—	3	3	—	59,000	60	31,400	1,309,330	11	—	236,500	52	31,400	1,131,830
HOLLAND																				
Scheepswerf En Machinefabriek "De Biesbosch," Dordrecht	1	—	3,500	1	—	—	—	—	—	—	—	1	—	3,500	—	—	—	1	—	3,500
C. Van Der Giessen & Zonen's Scheepswerven N.V. Krimpen, A/D Ijssel	6	—	95,550	3	—	2	—	1	2	—	26,000	4	—	69,550	4	—	62,650	2	—	32,900
Newerlandsche Dok En Scheepsbouw, Maatschappij Amsterdam	23	—	560,200	3	—	20	—	—	4	—	124,000	19	—	436,200	2	—	62,000	21	—	498,200
Rotterdamsche Droogdok Mij., Rotterdam, & New Waterway Shipbuilding Co., Schiedam	9	—	138,000	—	—	7	—	1	—	—	—	9	—	138,000	2	—	28,000	6	—	110,000
N.V. Kon. Mij. "De Schelde," Flushing	2	—	38,300	—	—	2	—	—	—	—	—	2	—	38,300	—	—	—	2	—	38,300
Werf Jan Smit CZN, N.V. Albasserdam	4	—	94,400	1	—	—	—	3	—	—	—	4	—	94,400	—	—	—	4	—	94,400
Mach & Scheeps Van P. Smit, Jr., Rotterdam	5	—	85,000	2	—	3	—	—	—	—	—	5	—	85,000	1	—	18,000	4	—	67,000
Dok-en Werf-Maatschappij Wilton-Fijenoord N.V., Schiedam	9	—	178,300	3	—	4	2	—	5	—	90,000	4	—	88,300	5	—	122,000	4	—	56,300
TOTAL	58	—	1,193,250	13	—	38	2	5	11	—	240,000	47	—	953,250	14	—	292,650	44	—	900,600

ANALYSIS OF TANKERS UNDER CONSTRUCTION IN SHIPYARDS OF THE WORLD DECEMBER 31, 1953

CONTINENTAL SHIPYARDS	NO. OF TANKERS BUILDING	GROSS TONS	D.W.T.	DIESEL	DIESEL TRIC TRIC	TURBINE	TURBO-ELECTRIC	RECIPROCATING STEAM	BRITISH OWNERS NO.	BRITISH OWNERS T.G.	BRITISH OWNERS D.W.T.	FOREIGN OWNERS NO.	FOREIGN OWNERS T.G.	FOREIGN OWNERS D.W.T.	OIL COMPANIES NO.	OIL COMPANIES T.G.	OIL COMPANIES D.W.T.	INDEPENDENTS NO.	INDEPENDENTS T.G.	INDEPENDENTS D.W.T.
ITALY																				
Ansaldo S.A., Genova Sestri, Muggiano, La Spezia & Livorno	5	—	122,220	1	—	4	—	—	—	—	—	5	—	122,200	—	—	—	5	—	122,200
Cantieri Navali Ruiniti S.p.A., Genoa-Via Cipro 11	4	—	78,500	—	—	4	—	—	—	—	—	4	—	78,500	—	—	—	4	—	78,500
Cantieri Navali Di Taranto S.p.A., Via Torino, 135, Rome	1	—	19,000	1	—	—	—	—	—	—	—	1	—	19,000	—	—	—	1	—	19,000
Cantieri Riunti Dell' Adriatico, Trieste and Monfalcone	9	—	211,950	6	—	3	—	—	—	—	—	9	—	211,950	—	—	—	9	—	211,950
Cantieri Del Tirreno, S.p.A., Genoa	1	—	10,000	—	—	1	—	—	—	—	—	1	—	10,000	—	—	—	1	—	10,000
S.A. Navalmeccanica, Di Stabia	1	—	18,700	1	—	—	—	—	—	—	—	1	—	18,700	—	—	—	1	—	18,700
TOTAL	21	—	460,350	9	—	12	—	—	—	—	—	21	—	460,350	—	—	—	21	—	460,350
NORWAY																				
A/S Akers Mek. Verksted, Oslo	1	—	14,750	1	—	—	—	—	—	—	—	1	—	14,750	—	—	—	1	—	14,750
A/S Framnaes Mek Verksted, Sandefjord	4	—	63,150	4	—	—	—	—	—	—	—	4	—	63,150	1	—	15,750	3	—	47,400
A/S Fredriksstad Mek. Verksted, Fredrikstad	10	—	154,500	10	—	—	—	—	—	—	—	10	—	154,500	—	—	—	10	—	154,500
Marinens Hovedverft, Horten	4	—	70,000	4	—	—	—	—	—	—	—	4	—	70,000	—	—	—	4	—	70,000
Kaldnes Mek, Verdsted A/S, Tonsberg	6	—	108,000	4	—	2	—	—	—	—	—	6	—	108,000	—	—	—	6	—	108,000
Langesunds Mek, Verksted A/S	3	—	29,500	2	—	—	—	1	—	—	—	3	—	29,500	—	—	—	3	—	29,500
A/S Rosenberg Mek Verksted, Stavanger	8	0	240,200	8	—	—	—	—	—	—	—	8	—	240,200	—	—	—	8	—	240,200
A/S Stord, Stord	2	—	10,000	2	—	—	—	—	—	—	—	2	—	10,000	—	—	—	2	—	10,000
Tangen Verft, Kragero	3	—	29,600	2	—	—	—	1	—	—	—	3	—	29,600	—	—	—	3	—	29,600
TOTAL	41	—	719,700	37	—	2	—	2	—	—	—	41	—	719,700	1	—	15,750	40	—	703,950
SPAIN																				
Soc. Espanola De Construction Naval, Madrid	5	—	59,500	5	—	—	—	—	—	—	—	5	—	59,500	1	—	18,500	4	—	41,000
Union Naval De Levante S.A., Grao-Valencia	1	8,450	—	1	—	—	—	—	—	—	—	1	8,450	—	—	—	—	1	8,450	—
TOTAL	6	8,450	59,500	6	—	—	—	—	—	—	—	6	8,450	59,500	1	—	18,500	5	8,450	41,000
SWEDEN																				
Eriksbergs Mek. Verkstads A/B, Gothenburg	23	337,500	—	23	—	—	—	—	—	—	—	23	337,500	—	—	—	—	23	337,500	—
A/B Gotaverken, Gothenburg	18	—	370,900	16	—	2	—	—	—	—	—	18	—	370,900	—	—	—	18	—	370,900
Helsingborgs, Varfs A/B	1	—	6,600	—	—	—	—	1	—	—	—	1	—	6,600	—	—	—	1	—	6,600
Kockums Mek, Verkstads, A/B Malmo	23	—	470,500	14	—	9	—	—	—	—	—	23	—	470,500	—	—	—	23	—	470,500
A/B Lindholmens Varv., Gothenburg	3	—	65,000	3	—	—	—	—	—	—	—	3	—	65,000	—	—	—	3	—	65,000
A/B Oskarshamns Varv., Oskarshamn	2	21,000	—	2	—	—	—	—	—	—	—	2	21,000	—	—	—	—	2	21,000	—
Oresundsvarvet A/B, Landskrona	6	74,000	—	6	—	—	—	—	—	—	—	6	74,000	—	—	—	—	6	74,000	—
Uddevallavarvet A/B, Uddevalla	9	113,300	—	8	—	1	—	—	—	—	—	9	113,300	—	—	—	—	9	113,300	—
TOTAL	85	545,800	913,000	72	—	12	—	1	—	—	—	85	545,800	913,000	—	—	—	85	545,800	913,000
UNITED STATES OF AMERICA																				
Bethlehem-Sparrows Point Shipyard, Sparrows Point, Md.	11	—	261,400	—	—	11	—	—	—	—	—	11	—	261,400	2	—	33,000	9	—	228,400
Bethlehem Steel Co. Shipbldng. Division, Quincy, Mass.	8	—	236,700	—	—	8	—	—	—	—	—	8	—	236,700	1	—	26,950	7	—	209,750
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.	8	—	251,570	—	—	8	—	—	—	—	—	8	—	251,570	4	—	99,570	4	—	152,000
Sun Shipbuilding & Dry Dock Co., Chester, Pa.	5	—	145,400	—	—	5	—	—	—	—	—	5	—	145,400	3	—	85,900	2	—	59,500
TOTAL	32	—	895,070	—	—	32	—	—	—	—	—	32	—	895,070	10	—	245,420	22	—	649,650
CANADA																				
Davie Shipbuilding Ltd., Lauzon, Levis, Quebec	1	—	28,000	—	—	1	—	—	—	—	—	1	—	28,000	—	—	—	1	—	28,000
OTHER COUNTRIES																				
JAPAN																				
Harima Shipbuilding & Engrng. Co., Aioi, Hyogo	1	17,600	—	—	—	1	—	—	—	—	—	1	17,600	—	—	—	—	1	17,600	—
Hitachi Shipbuilding & Engrg. Co., Sakurajima Shipyard	1	—	20,600	—	—	1	—	—	—	—	—	1	—	20,600	—	—	—	1	—	20,600
Kawasaki Dockyard Co. Ltd.	3	—	74,750	—	—	3	—	—	—	—	—	3	—	74,750	—	—	—	3	—	74,750
Kure Shipyard leased to National Bulk-Carriers Inc., New York	2	—	83,500	—	—	2	—	—	—	—	—	2	—	83,500	—	—	—	2	—	83,500
Mitsubishi Nippon Heavy Industries, Ltd., Yokohama	1	12,300	—	1	—	—	—	—	—	—	—	1	12,300	—	—	—	—	1	12,300	—
Mitsubishi Heavy Industries, Kobe Shipyard & Engine Works	1	13,100	—	—	—	1	—	—	—	—	—	1	13,100	—	—	—	—	1	13,100	—
Mitsubishi Shipbuilding & Engrng. Co., Nagasaki Shipyard & Eng. Works	4	—	106,000	—	—	4	—	—	—	—	—	4	—	106,000	—	—	—	4	—	106,000
Mitsui Shipbuilding & Engrng. Co., Tamano	4	—	49,100	4	—	—	—	—	—	—	—	4	—	49,100	—	—	—	4	—	49,100
TOTAL	17	43,000	333,950	5	—	12	—	—	—	—	—	17	43,000	333,950	—	—	—	17	43,000	333,950
EUROPE																				
Belgium	15	52,000	234,550	8	—	7	—	—	—	—	—	15	52,000	234,550	7	13,000	142,050	8	39,000	92,500
Denmark	10	61,000	72,350	9	—	1	—	—	1	—	18,000	9	61,000	54,350	1	—	18,000	9	61,000	54,350
France	30	—	832,800	6	—	23	1	—	1	—	18,000	29	—	814,800	8	—	223,250	22	—	609,550
Germany	63	31,400	1,368,330	22	—	38	—	3	3	—	59,000	60	31,400	1,309,330	11	—	236,500	52	31,400	1,131,830
Holland	58	—	1,193,250	13	—	38	2	5	11	—	240,000	47	—	953,250	14	—	292,650	44	—	900,600
Italy	21	—	460,350	9	—	12	—	—	—	—	—	21	—	460,350	—	—	—	21	—	460,350
Norway	41	—	719,700	37	—	2	—	2	—	—	—	41	—	719,700	1	—	15,750	40	—	703,950
Spain	6	8,450	59,500	6	—	—	—	—	—	—	—	6	8,450	59,500	1	—	18,500	5	8,460	41,000
Sweden	85	545,800	913,000	72	—	12	—	1	—	—	—	85	545,800	913,000	—	—	—	85	545,800	913,000
TOTAL	329	698,650	5,853,830	182	—	133	3	11	16	—	335,000	313	698,650	5,518,830	43	13,000	946,700	286	685,650	4,907,130
COUNTRIES																				
Great Britain	208	114,460	4,205,090	101	—	103	2	2	136	54,960	2,874,490	72	59,500	1,330,600	75	20,900	1,651,230	133	93,560	2,553,860
Europe	329	698,650	5,853,830	182	—	133	3	11	16	—	335,000	313	698,650	5,518,830	43	13,000	946,700	286	685,650	4,907,130
United States of America	32	—	895,070	—	—	32	—	—	—	—	—	32	—	895,070	10	—	245,420	22	—	649,650
Canada	1	—	28,000	—	—	1	—	—	—	—	—	1	—	28,000	—	—	—	1	—	28,000
Japan	17	43,000	333,950	5	—	12	—	—	—	—	—	17	43,000	333,950	—	—	—	17	43,000	333,950
TOTAL	587	856,110	11,257,050	288	—	281	5	13	152	54,960	3,209,490	435	801,150	8,069,350	128	33,900	2,843,350	459	822,210	8,472,590

By Stuart Griffin

The Koho Maru, 27,764 dwt, building in 1953 at the Harima Shipbuilding Co. yards.

Japan building tankers for export

IT IS ANTICIPATED that Japanese shipyards will turn out about 100,000 gross tons of tankers during the current fiscal year which extends from April 1 to March 31, 1955. These vessels will be entirely for foreign owners since the national shipbuilding program, aimed at 330,000 gross tons, is held up, temporarily at least, by scandals involving a leading firm and its officials. On account of the delay in announcing the government's tenth shipping plan, builders are vying for export orders, particularly tankers. They are also endeavoring to get export allocations under the link system with payment in raw sugar, mainly from Cuba, and cotton, principally from Egypt.

Applications already submitted include the following:

(1) One 35,000-dwt tanker for Liberia or Greece by the Mitsui Shipbuilding and Engineering Co.

(2) Two 38,750-dwt tankers for Liberia by the Harima Shipbuilding and Engineering Co.

(3) One 35,000-dwt tanker for Liberia by the Nippon Kokan (Steel Tube) Co.

(4) Two 20,000-dwt tankers for Liberia by the Hitachi Shipbuilding and Engineering Co.

(5) One 35,000-dwt tanker and two of 20,000-dwt for Greece by the Mitsubishi Heavy Industries Co. Reorganized.

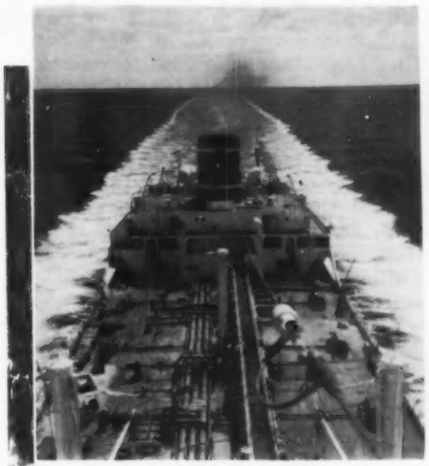
A number of contracts are still in stage of negotiation, but two firms have inked contracts to construct three tankships, two for Panamanian and one for Liberian registry, under the raw sugar link system.

Another contract for a 35,000-dwt tankship between Mitsubishi and an unnamed Liberian firm probably will be signed soon.

Since the ships will be paid for on the installment plan which, together with promised quick delivery and low costs, was what attracted the foreign interests to Japanese firms initially, these contracts will not be very profitable to the builders.

While the rates charged under recent construction contracts are not made public, they reportedly are in the range of $120-$130 per ton on 35,000-dwt vessels. Some orders are said to have been placed at $10 to $12 below these figures. Slight concessions are believed to have been made in some instances in order to keep yards open.

Still, export of four vessels, aggregating 133,200 dwt, is considered reassuring since it will serve to end, temporarily at least, idleness at several major yards.



Japan Oil Company's Persia Maru, completed last November by Mitsubishi Shipbuilding, is on the Japan-Persian Gulf service.

Other Japanese tanker-building firms are reported to be actively searching for foreign export business. These firms include Kawasaki Heavy Industries, Uraga Dockyards, New Japan Heavy Industries and others. The Mitsubishi organization has several tankers under way at its different yards, the keels for which were laid in late 1953 and which are being built for Japanese firms. These include two turbine-driven vessels and one diesel.

Additional oil tanker building is proceeding at the former Imperial Japanese Navy dockyards at Kure, where the American firm, National Bulk Carriers, is operating an $850,000 10-year lease. During the past two years this firm constructed several large tankers for its fleet or for chartering purposes.

In December 1952 it completed the Petro Kure, 23,500-gt and 38,000-dwt; in March 1953 the Petro King, of the same tonnages; on June 25, 1953 the Petro Queen, 21,000-gt and 36,000-dwt; and on October 2, 1953 the Petro Emperor, of the same tonnages.

NBC also has just finished the tankship Phoenix (26,000-gt and 45,000-dwt) for Universe Tank Ship, Inc., an American firm affiliated with NBC. It is expected to start work shortly on additional large-size oilers.

The American firm is using two-thirds of the former Japanese naval facilities where in 1943 was completed the superdreadnaught Yamato of 60,000-ton displacement which met its fate off Okinawa on a suicidal mission in the closing days of the Pacific war.

Despite its current doldrums, the Japanese oil tanker fleet has made tremendous strides in getting back from the desperate days immediately after the surrender in 1945.

Japan now has 177 tankers as against the highest prewar or wartime total which stood at 267 vessels in 1944. In 1940, there were 94 oil tankers, so that the 1954 tank-ship fleet exceeds in numbers the 1940 prewar fleet.

The wartime total of course included not only the wartime-built and standardized vessels constructed by the Japanese navy, but also many Japan-chartered foreign vessels and ships requisitioned or seized by Japanese authorities.

Prewar, the tanker fleet's gross tonnage stood at 403,000, measured in deadweight tons at 650,000. This figure rose in 1944 to 824,000 gross, 1,075,000 deadweight tons. By December 31, 1953, the total, primarily from postwar construction, had reached 643,076 gross, and 975,938 deadweight tons. Large-size ocean-going tankships amounted to 537,400 gross, and 827,425 deadweight tons.

Thus, in point of tonnage as well as number of units, Japan's 1954 tanker fleet exceeds its strength prewar.

Postwar construction from 1946-1953 added almost 360,000 gross tons to a fleet decimated by Allied undersea and aerial attack. Figures reported by courtesy of the Ministry of Transportation Shipping Bureau show the following construction:

YEAR	GROSS TONS
1946	6,750
1947	5,200
1948	11,100
1949	6,392
1950	75,004
1951	49,870
1952	80,036
1953	125,560

Tankers built for export in the 1946-53 postwar period, under nine separate SCAP and Japanese government-sponsored shipbuilding phases, aggregated 400,000 gross tons, the ships being delivered to Denmark, Norway, Panama, Liberia, Finland, the United Kingdom and Brazil. Small coastal tankers will be built by private enterprise in the amount of approximately 70-80,000 deadweight tons, each between 1,500 and 3,000 dwt.

Japan's major tanker fleets now include the following: Iino Marine Transportation, 14 oilers, 219,800-dwt, largest ships

being the Yuho Maru and the Koho Maru, each of 27,764 dwt, and the Seiho Maru, 20,000 dwt; Mitsubishi Marine Transportation, four tankers, 63,964 dwt, the newest being the St. Louis Maru of 18,484 dwt and the San Pedro Maru of 18,000 dwt; Japan Oil Tanker, seven vessels, 90,785 dwt, paced by the 18,130-dwt Arabia Maru; Nippon Suisan, four tankships, 70,308-dwt headed by the 17,957-dwt Matsushima Maru; Morita Steamship Co., two vessels, with the 15,561-dwt Yuyo Maru; the Kyoei Tanker Co., seven vessels, 28,300-dwt, with one large pelagic tanker, the 18,804-dwt Taiei Maru; Taiheiyo Marine Transportation, three vessels, 51,102-dwt, led by the 20,530-dwt Howa Maru; the Terukuni Marine Transportation Co., two vessels, 38,158-dwt, the latest received being the 19,092-dwt Terukuni Maru; the Nitto Steamship Co., seven tankships, 100,020-dwt, led by the Nichiei Maru, 18,775-dwt; and Taiyo Gyogyo (Fisheries), four vessels, 66,850-dwt, the largest and newest being the 23,000-dwt Nisshi Maru.

The latest information on Japanese-flag tankers recently built or still building is this: (1) Yuyo Maru No. 3, built for the Morita Steamship Co. by the Nagasaki dockyard of Mitsubishi Shipbuilding Co., 20,000-dwt, to be completed in August 1954; (2) Persia Maru, built for the Japan Oil Tanker Co. by Mitsubishi Shipbuilding Co., 20,000-dwt, finished in November 1953; (3) Ise Maru, for Terukuni Marine Transportation, by Harima Shipbuilding & Engineering, 20,000-dwt, launched March 1954, to be completed July 1954; (4) Yoho Maru, for Iino Marine Transportation, by Mitsubishi Heavy Industries, 20,000-dwt, completed December 1953; (5) Shuho Maru, for the Iino Co., by Kawasaki Heavy Industries, 18,000-dwt, launched April 1954, to be completed in June-July 1954; (6) Mimurasan Maru, for Mitsui Shipping Co., by Mitsui Shipbuilding Co., 20,000-dwt, completed March 1954; (7) Sumatra Maru, for Japan Tanker Co., by Hitachi Shipbuilding, 20,000-dwt to be completed August 1954; and San Ramon Maru, for Mitsubishi Marine Transportation, by Mitsubishi Japan Heavy Industries, 20,000-dwt, to be completed in July 1954.

The Persian Gulf continues to absorb the majority of the Japanese-flag tanker interest, 60 percent as opposed to 40 percent for the United States and South America. No petroleum to speak of is originating from Indonesia.

Estimates are difficult to come by, but on the average day, 30 oilers of 542,000-dwt are plying to and from the Middle East; five ships of 95,000-dwt to and from South America's Aruba and Curacao refineries; and eight vessels engaged in U.S. and cross trade—six to the U.S., 99,000-dwt, and two in cross trade, 42,000-dwt.

In calendar 1953, Japan received 7,741,000 long tons, or 8,540,000 kiloliters from foreign oil sources, almost full capacity for available domestic refinery space. Japanese-flag bottoms hauled 3,885,000 long tons, or 4,550,000 kiloliters, while the balance was transported in foreign-flag ships chartered by Japan. Japan's own tanker fleet's oil-bearing capacity is now, as of April 1, 1954, some six million long tons. This compares with the carrying capacity of the 1940 overseas fleet of 4,440,000 kiloliters.

Thus Japan postwar has more tankers than prewar; yet the same amount of oil is carried by each fleet. The reason: Japan has changed from Indonesia to the Persian Gulf for import resources.

In 1953, the profit rate started off well, but fell off markedly in the autumn and winter months. In fact, no dividend was distributed for the second half of fiscal 1953.

In the spring of 1953, the tanker freight situation became depressed, but because of the long-term contracts already concluded, the Japanese firms did not feel the pinch until these contracts expired last fall. Business operations, however, are showing no loss, unless amortization is taken into consideration.

The future of Japanese shipbuilding will be difficult to foresee until the effect of the current scandals is resolved.

Subsidies may be stopped and thus the prices per ton of steel building materials might be forced up. That would leave Japan at a price disadvantage, internationally speaking, and might cut into the nation's export sales prospects. But the authorities have taken full cognizance of this situation and it is likely that export subsidies will be authorized to prevent Japan's shipyards from being priced out of international markets. Tanker building may also be linked to required imports.

No one in a position of power expects to see the Japanese tanker industry disrupted. Its overall importance is too keenly realized.

Navy advocates U. S. tanker building

A PROGRAM for reconstruction and modernization of the United States tanker fleet has been put forward by the Maritime Administration with the backing of the Navy, acting through the Military Sea Transport Service. The proposal, embodied in a report now before the Senate Commerce Committee, advances plans for a general shipbuilding program for the construction of 60 ships per year over the next few years, including 20 tankers with a deadweight of 25,000 tons minimum and a loaded speed of 18 knots to be built in United States yards. Other suggested specifications are 32-foot draft, 84-foot beam and an overall length of 650 feet.

It is pointed out that while the tanker fleet of the United States had risen to over 12,000,000 tons deadweight in the wartime period from 1939 to 1945, it has since been reduced to less than 8,000,000 tons by sales to foreign owners, scrapping and wartime losses. Moreover, the majority of the oil-carrying vessels are nine years old or more, and by reason of their slow speed and small capacity are uneconomical to operate. Modern tankers are of 25,000 tons or more with a speed of 18 knots or higher. The report showed that military liftings of petroleum had reached more than 130,000,000 barrels in 1953. The sums needed to pay the transportation cost of this huge quantity would be sufficient, it was calculated, to provide the whole amount needed in subsidies for operation over a ten year period. The proposed method of financing the building plan is to have the vessels built by private contractors and to have excess costs recovered by charter terms over a period of 20 years.

Aside from the need of expanding the merchant fleet and putting it in better condition to meet emergency demands, a reason for advocating the tanker building program at this time is to keep shipyards in operation and prepared to cope with heavy demands that might arise in the future.

Oil company income reaches new high in 1953

EXCEEDING EARLIER anticipations during its course, the year 1953 proved to be one of record earnings for the oil industry of the United States. Reports of 47 companies show net income of $2,740,295,034 compared with $2,553,871,428 in 1952 and $2,625,567,507 in 1951, the previous high mark. The gain of $186,423,606 or 7.3 percent in net income recorded in 1953 over the preceding year was widely distributed, 40 of the reporting companies showing increases while only seven had smaller earnings.

The largest gains in total earnings, though not necessarily in proportion to capital investment, naturally were made by companies with widespread operations. Gulf Oil Corp. led the way with an increase of $33 million in net income, Shell increased earnings by over $24 million; Humble raised its income by nearly $19 million, Socony-Vacuum $16 million, Standard of California $15 million and Texas $11 million. Smaller companies did as well proportionately.

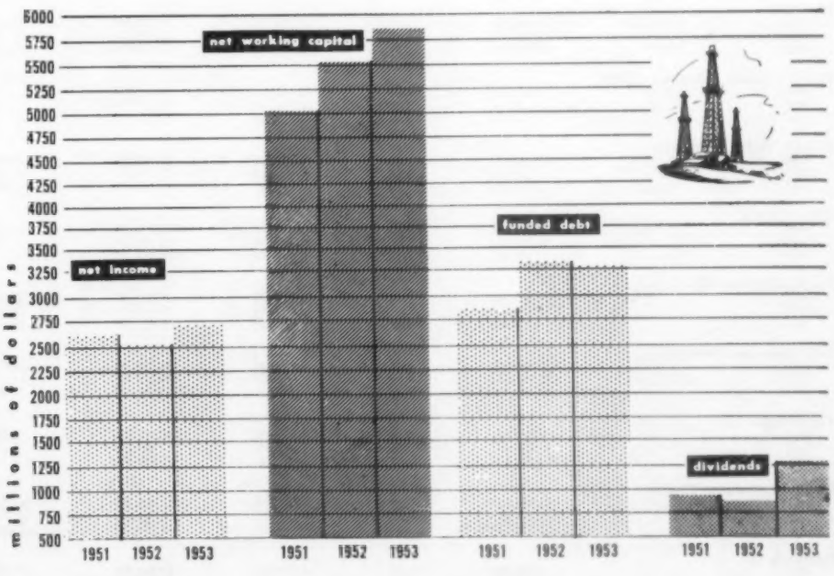
Dividends of $1,278 million paid during 1953 represented 46.6 percent of net income as compared with 45 percent so disbursed in 1952. Stock dividends were few in number. Sun Oil Co. adhered to its established practice in following this form of distribution and Shell Oil Co. declared a stock dividend in addition to its regular cash declaration. A few companies rewarded their stockholders by distributing shares held by them in other companies. Stock splits were few in comparison with the number that had taken place in immediately preceeding years. The increase in shares issued amounted to only five and a half million out of the outstanding total of 467,594,582. Early in 1954 Shell Oil Co. voted a two for one split of its shares and Tidewater Associated declared a five percent stock dividend.

Net working capital of the reporting companies increased by something over $300 million during 1953, funded debt declined by about $45 million, while earned surpluses rose by $1,204 million.

The rising trend in earnings which made itself felt in 1953 was continued during the first quarter of 1954. Reports of 30 representative companies, including both fully integrated organizations and those engaged solely in production, show net income of $551,327,000 for the first three months of 1954 as compared with $479,073,000 for the corresponding period of 1953. This is a gain of $72,254,000 or 15.1 percent. Of the 30 companies, 21 had higher earnings during the first three months of the current year than in the corresponding quarter of 1953, while one integrated company and one engaged only in production had slightly smaller earnings. Since the early months of the year are not usually the period of best returns, this showing must be regarded as an augury of favorable results in succeeding quarters which may enable 1954 to equal or possibly to surpass the highly satisfactory showing of the preceeding year.

The tabulation on the following pages of the financial records of 47 oil corporations over the past three years includes two affiliates of United States companies operating in Canada and one in Venezuela. The showing of these companies closely parallels that of the purely domestic operators.

For a tabulation of first-quarter 1954 earnings for 30 major oil companies, see page 89.



Comparison of net working capital, funded debt, net income, and dividends paid by oil companies in the past three years.

THREE YEARS FINANCIAL REVIEW OF

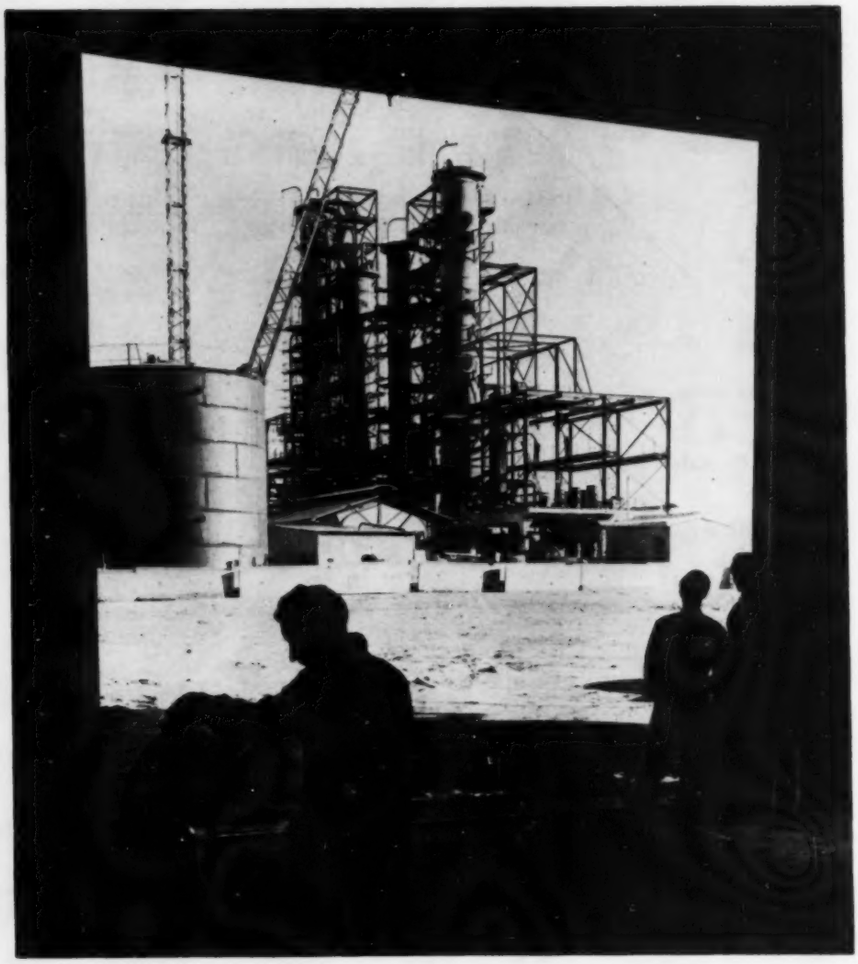
	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Anderson Prichard								
1953	$4,441,574	$5.46	$8,140,693	$36,820,232	$11,100,000	.....	813,433	$34,636,667
1952	3,766,530	4.63	5,033,879	29,122,933	3,000,000	.....	813,433	31,821,595
1951	4,846,890	5.96	4,069,919	26,549,121	1,400,000	.....	813,433	29,682,295
Amerada Corp.								
1953	18,445,590	5.85	29,806,707	60,853,614	.....	.....	3,154,700	79,504,136
1952	15,896,360	5.04	26,697,509	55,087,445	.....	.....	3,154,700	79,986,746
1951	16,296,652	5.17	27,083,318	48,083,598	.....	.....	3,154,700	73,554,485
Ashland Oil								
1953	8,407,616	1.26	45,071,254	76,307,671	33,521,000	779,056	5,396,609	57,137,161
1952	5,700,273(A)	.88(A)	53,589,550	67,516,249	34,746,000	.....(B)	5,396,520	56,094,912
1951	12,137,972	2.37	37,276,220	56,813,668	29,208,500	.....(B)	2,197,310	53,562,045
Atlantic Refining Co.								
1953	49,755,124	5.41	36,786,226	390,763,787	32,022,836	352,000	8,961,977	284,758,547
1952	40,476,692	4.37	52,710,676	525,753,009	31,367,659	352,000	8,961,977(C)	254,192,532
1951	45,067,298	12.20	71,549,052	481,541,936	37,479,000	352,000	3,584,791	232,061,880
British American								
1953	19,735,000	2.40	35,989,417	136,578,123	42,530,200	.....	8,208,118	136,262,220(D)
1952	14,130,399	1.78	36,427,282	122,325,384	47,677,180	.....	7,955,942	118,022,869(D)
1951	13,099,301	1.72	31,579,965	99,378,621	34,187,420	.....	7,955,942	101,595,289(D)
Cities Service								
1953	50,720,779	13.05	266,257,577	701,675,936	461,485,673	.....	3,887,100	435,290,103
1952	49,258,591	12.67	237,700,231	674,120,703	419,286,593	.....	3,887,100	404,412,038
1951	57,177,581	14.71	201,935,592	620,628,334	363,053,822	.....	3,887,100	374,588,947
Continental Oil Co.								
1953	40,874,666	4.20	68,199,014	246,655,600	53,384,259	.....	9,736,916	244,802,917
1952	38,087,890	3.91	61,211,500	218,331,246	32,090,741	.....	9,736,916	229,243,355
1951	41,292,692	4.25	50,917,770	189,849,331	340,697	.....	9,736,916	215,115,907
Creole Petroleum Corp.								
1953	228,997,000	8.85	191,736,100	550,948,031	.....	.....	25,865,310	439,131,763
1952	220,931,000	8.54	181,682,100	513,871,600	.....	.....	25,865,310	391,191,927
1951	202,278,300	7.82	172,820,500	473,058,000	.....	.....	25,865,310	351,318,113
Deep Rock Oil								
1953	1,531,000	3.26	10,195,572	24,545,059	7,362,720	.....	469,207	27,910,712(D)
1952	904,164	2.01	10,471,841	24,518,990	8,554,310	.....	449,207	26,257,451(D)
1951	2,241,385	4.99	9,812,111	22,426,172	6,980,900	.....	449,207	26,251,701(D)
Gulf Oil Co.								
1953	175,036,000	7.13	424,644,000	890,538,173	178,509,631	.....	24,541,943	565,024,141
1952	141,820,000	6.01	366,744,000	823,005,470	181,729,800	.....	23,598,120	475,874,189
1951	140,071,000	6.17	325,725,000	785,045,048	185,023,669	.....	22,690,500	424,815,861
Honolulu Oil								
1953	10,172,000	5.42	14,731,462	41,490,641	2,637,887	.....	1,875,486	35,433,427
1952	7,343,224	3.92	13,877,395	36,900,095	2,613,528	.....	1,875,486	48,704,563
1951	7,927,002	4.23	14,320,666	34,136,047	2,981,326	.....	1,875,486	46,050,054
Houston Oil Co. of Texas								
1953	6,709,844	5.05	6,107,610	66,835,840	19,192,000	.....	1,329,600	18,862,855
1952	6,344,057	4.81	8,142,678	61,627,326	16,700,000	.....	1,320,000	15,135,980
1951	7,053,640	6.42	6,683,530	54,500,464	11,900,000	.....	1,100,000	22,648,331
Humble Oil & Refining Co.								
1953	164,258,000	4.58	126,566,000	915,822,106	44,346,869	.....	36,000,000(E)	539,474,805
1952	145,292,144	4.05	116,450,247	854,366,087	51,171,679	.....	36,000,000(E)	456,970,024
1951	169,480,626	4.72	143,316,000	770,576,613	55,367,220	.....	35,878,036(E)	393,473,076
Imperial Oil, Ltd.								
1953	47,984,515	1.60	166,168,365	291,904,708	50,919,199	.....	29,847,227	235,254,263
1952	41,196,499	1.38	186,111,038	258,440,433	53,422,878	.....	29,847,227	221,460,451
1951	35,951,153	1.20	217,608,973	209,593,207	55,808,725	.....	29,847,227	204,340,216
Louisiana Land & Exploration Co.								
1953	10,602,359	3.56	5,477,117	10,184,577	.....	.....	2,977,306	12,860,939
1952	8,471,952	2.85	6,342,685	7,758,682	.....	.....	2,977,306	14,167,804
1951	8,557,038	2.87	6,240,302	6,797,863	.....	.....	2,977,306	13,139,117
Lion Oil								
1953	10,688,260	3.46	25,784,256	99,039,397	36,250,000	.....	3,090,890	54,333,619
1952	10,211,425	3.30	26,207,331	74,930,620	37,500,000	.....	3,090,884	49,827,134
1951	11,751,026	4.37	25,517,316	67,436,908	25,000,000	.....	2,690,861	45,397,453
Mid-Continent Petroleum Corp.								
1953	14,394,239	7.75	63,448,878	90,522,953	.....	.....	1,857,912	134,038,463
1952	15,590,497	8.39	60,536,199	87,727,923	.....	.....	1,857,912	127,073,134
1951	17,062,182	9.18	57,616,427	81,715,752	.....	.....	1,857,912	117,493,268
Middle States Petroleum								
1953	2,550,271	1.10	4,522,391	31,113,347	14,434,299	.....	2,316,519	17,793,339(D)
1952	2,162,835	.93	1,605,320	28,104,261	12,034,302	.....	2,141,977	15,243,068(D)
1951	3,593,191	1.68	3,141,789	25,483,735	12,034,405	.....	2,141,977	15,219,079(D)
Ohio Oil Co.								
1953	43,579,000	6.63	64,117,355	192,257,461	.....	.....	6,563,377	177,143,123
1952	39,354,021	6.00	62,871,548	169,156,526	.....	.....	6,563,377	154,934,924
1951	41,681,663	6.35	65,073,000	146,012,407	.....	.....	6,563,377	135,271,032
Pacific Western Oil Co.								
1953	11,672,586	2.24	15,998,148	29,564,089	38,496,199	1,288,207	4,987,647	41,860,083
1952	8,968,934	1.69(F)	14,501,574	27,698,474	39,567,162	1,325,000	4,534,224	32,406,100
1951	7,805,680	1.60	7,650,669	23,323,507	29,055,032	1,374,007	4,534,224	23,967,169
Pan American Petroleum								
1953	20,982,593	4.45	1,968,091	174,358,338	36,910,770	.....	4,702,944	154,296,288
1952	20,961,672	4.44	1,793,007	149,639,811	31,678,088	.....	4,702,944	165,133,671
1951	24,286,431	5.14	1,347,921	132,166,427	34,305,560	.....	4,702,944	152,494,998
Pan Handle Oil								
1953	1,064,631	0.67	2,333,437	10,985,528	2,765,977	.....	1,592,970	10,631,104(D)
1952	877,143	0.55	1,793,007	11,491,291	3,633,568	.....	1,592,970	10,044,364(D)
1951	1,352,620	0.85	1,347,921	12,018,412	4,166,487	.....	1,592,970	9,645,117(D)
Phillips Petroleum Co.								
1953	76,760,231	5.25	151,467,834	755,460,600	261,552,533	.....	14,613,520	357,533,264
1952	75,284,261	5.17	105,221,767	675,952,572	177,391,026	.....	14,563,093	318,710,907
1951	73,711,229	5.45	86,117,589	562,276,683	92,622,983	.....	14,423,139	279,642,231
Plymouth Oil								
1953	8,059,008	3.32	19,537,000	47,268,731	19,029,103	.....	2,432,489	29,956,007
1952	9,648,095	3.97	14,816,098	44,838,499	14,788,227	.....	2,429,967	26,801,045
1951	10,295,791	4.24	13,784,597	40,765,285	14,219,946	.....	2,427,785	27,430,264

UNITED STATES OIL COMPANIES

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Pure Oil Co.								
1953	27,104,723	6.12	83,451,938	251,236,439	25,631,113	442,434	4,067,596	203,386,195
1952	27,304,373	6.17	84,775,375	238,533,416	28,353,800	442,434	4,067,727	180,660,467
1951	33,593,727	7.88	80,462,776	214,676,510	26,617,267	442,434	3,982,031	186,356,227
Quaker State Oil								
1953	2,096,424	2.27	9,301,438	14,638,311	.....	.....	927,305	24,757,533(D)
1952	1,863,480	2.01	8,738,116	14,920,391	.....	.....	927,269	24,574,922(D)
1951	2,148,036	2.32	11,716,116	11,698,643	.....	.....	927,269	24,566,905(D)
Richfield Oil Corp.								
1953	28,525,486	7.13	62,032,740	165,645,132	71,000,000	.....	4,000,000	89,179,986
1952	25,624,998	6.41	65,111,251	127,350,666	50,000,000	.....	4,000,000	74,654,500
1951	28,218,281	7.05	61,685,893	119,596,048	50,000,000	.....	4,000,000	63,029,502
Seaboard Oil Co.								
1953	6,540,000	5.36	10,525,847	34,103,396	.....	.....	1,219,323	24,933,272
1952	6,715,000(G)	5.51	12,814,754	44,370,909	.....	.....	1,219,323	16,390,594
1951	6,425,299	5.26	10,780,543	22,175,244	.....	.....	1,220,613	12,928,890
Shell Oil Co.								
1953	115,407,000	8.40	191,695,000	565,368,984	143,205,000	.....	13,470,038	435,570,051
1952	90,872,834	6.61	205,855,000	491,747,197	149,307,000	.....	13,470,625	380,444,549
1951	97,020,194	7.06	203,581,838	429,613,053	117,307,000	.....	13,470,625	329,983,590
Signal Oil & Gas								
1953	9,266,196	2.60	13,308,496	46,172,647	.....	.....	3,560,155(H)	53,688,260
1952	7,324,496	2.06	24,435,297	36,005,268	.....	.....	1,129,884	53,365,528
1951	8,549,329	3.00	25,089,627	31,107,164	.....	.....	1,129,884	47,834,847
Sinclair Oil Corp.								
1953	68,061,006	5.53	238,748,470	720,101,284	334,548,858	.....	12,997,750	579,460,542
1952	86,475,303(I)	7.08(I)	185,373,682	649,031,756	248,360,540	.....	12,928,205	539,395,625
1951	81,898,490	6.78	210,566,678	530,708,538	215,384,829	.....	12,077,604	480,029,556
Skelly Oil Co.								
1953	31,276,785	5.44	42,495,715	201,828,604	10,535,000	.....	2,873,059	89,715,533
1952	28,032,692	4.87	35,543,817	187,761,735	11,600,000	.....	2,873,059	139,601,882
1951	31,074,985	5.40	28,422,405	176,082,837	12,400,000	.....	2,611,872	127,239,544
Socony-Vacuum Oil Co., Inc.								
1953	187,250,000	5.35	477,734,711	1,069,330,985	166,075,000	.....	35,512,203	1,091,901,984
1952	171,092,000	5.27	463,021,000	980,499,000	168,075,000	.....	34,464,000	983,361,409
1951	161,622,000	5.08	348,653,000	880,791,000	169,575,000	.....	31,801,880	826,793,635
Standard Oil Co. of Calif.								
1953	189,453,450	6.61	273,239,698	1,037,659,400	79,411,503	.....	28,673,192	903,180,268
1952	174,030,499	6.07	235,136,136	977,159,390	85,167,448	.....	28,673,192	799,746,394
1951	173,341,211	6.05	227,860,822	903,492,635	94,501,727	.....	28,673,192	711,735,471
Standard Oil Co. of Ind.								
1953	124,830,000	8.11	407,470,000	1,325,447,017	354,733,943	.....	15,386,519	1,052,244,389
1952	119,981,438	7.81	412,265,204	1,239,608,852	355,260,410	.....	15,361,202	972,810,073
1951	148,697,356	9.71	323,485,854	1,137,879,551	250,350,978	.....	15,320,249	888,585,192
Standard Oil Co. of Ken.								
1953	10,441,246	4.01	21,688,063	45,397,966	.....	.....	2,604,490	44,622,376
1952	10,271,684	3.94	19,929,240	43,500,145	.....	.....	2,604,790	42,344,302
1951	9,777,133	3.75	19,787,373	40,484,996	.....	.....	2,604,790	66,083,691
Standard Oil Co. of N. J.								
1953	522,826,000	9.13	1,339,077,000	2,704,656,508	444,051,266	.....	60,571,092	2,499,074,535
1952	519,981,000	8.58	1,294,408,000	2,518,550,604	459,445,000	.....	60,571,092	2,220,974,394
1951	528,460,779	8.72	1,206,514,211	2,272,915,854	440,973,256	.....	60,571,092	1,957,718,665
Standard Oil Co. of Ohio								
1953	21,217,675	5.08	71,552,678	169,770,967	34,641,552	226,178	4,019,484	150,611,637
1952	17,697,083	4.20	73,282,421	158,847,410	36,927,869	231,550	4,010,481	139,857,464
1951	23,164,581	5.56	71,530,669	155,403,855	38,363,393	236,922	4,010,067	132,627,644
Sun Oil Co.								
1953	45,153,602	5.85	78,080,151	320,066,168	19,243,750	93,197	7,729,515	58,587,213
1952	43,013,063	6.01(J)	88,187,675	264,614,939	10,350,000	93,197	7,161,965	57,848,351
1951	45,343,643	6.85(J)	93,362,290	219,918,557	6,880,000	93,197	6,564,231	60,723,474
Sunray Oil Co.								
1953	27,572,827	2.54	44,996,644	230,471,007	78,520,000	1,249,309(E)	10,274,974	162,378,778
1952	27,724,411	2.30	36,064,375	226,656,046	79,948,833	1,594,704(E)	9,990,210	143,499,860
1951	24,282,516	2.23	32,375,633	221,819,411	80,272,675	1,682,038	9,966,400	131,954,070
Superior Oil of Calif.								
1953	12,000,381	28.37	22,381,157	93,449,582	29,638,187	.....	423,014	83,605,800
1952	11,900,164	28.13	17,071,109	87,119,064	30,919,574	.....	423,014	73,284,433
1951	13,295,639	31.43	16,430,257	78,117,824	32,558,318	.....	423,014	72,022,660(D)
The Texas Co.								
1953	192,600,078	7.01	484,710,549	1,018,238,080	219,527,543	.....	27,595,248	714,371,173
1952	181,242,172	6.59	464,126,528	957,085,922	226,288,949	.....	27,595,248	639,568,264
1951	178,774,677	6.50	385,699,764	844,195,788	180,252,197	.....	27,510,693	534,835,584
Texas Gulf Producing Co.								
1953	4,230,659	3.47	3,535,640	20,948,599	3,600,000	.....	1,218,138	10,218,334
1952	3,185,498	2.88	3,634,340	18,400,075	2,350,000	.....	1,107,064	8,806,380
1951	3,152,765	2.85	2,504,015	17,891,756	2,350,000	.....	1,097,928	6,959,220
Tide Water Associated Oil Co.								
1953	36,951,568	2.89	88,010,656	207,136,635	.....	.....	12,793,618(E)	184,948,219
1952	31,082,246	2.43	83,694,666	190,194,667	.....	.....	12,793,618(C)	162,709,312
1951	37,089,688	2.90	78,053,838	178,388,946	.....	.....	6,396,809	213,399,338
Union Oil Co. of Calif.								
1953	38,099,602	6.41	93,154,778	322,683,906	122,111,274	234,500	5,809,397	125,837,453
1952	27,579,759	4.61(J)	73,066,554	305,437,161	118,203,207	237,885	5,266,270	122,653,656
1951	27,294,971	5.01	50,101,535	280,666,765	84,906,549	242,500	5,266,270	95,073,897
Warren Petroleum								
1953	10,230,032	6.02	9,230,766	82,668,471	37,963,400	.....	1,699,626	60,689,641
1952	8,163,717	4.80	8,745,355	74,955,859	36,328,000	.....	1,699,450	53,017,986
1951	6,463,860	3.80	5,264,729	51,390,578	17,931,000	.....	1,699,450	43,499,677
Wilcox Oil								
1953	928,416	3.30	1,640,278	5,628,339	370,000	.....	280,773	5,577,079
1952	768,664	2.73	1,220,365	4,514,907	400,000	.....	280,773	6,333,302
1951	860,004	3.06	1,277,694	4,520,314	.....	.....	280,773	5,845,412

A. Restated: 1952 net income reduced from $14,249,117 because of $8,548,844 being used to save investment.
B. Do not have figures for number of preferred shares for 1951-2.
C. By two for one stock split.
D. Includes common stock.
E. Shares issued.
F. Restated on the basis of 4,987,647 shares of common outstanding at Dec. 31, 1953.
G. Restated on the basis of the change in the accounting practice relating to unproved properties.
H. Three for one stock split on Class A stock.
I. Includes special credit of $9,630,351 (79 cents per share).
J. Adjusted to shares outstanding Dec. 31, 1953.

Geelong refinery operating



Distillation unit as seen through doorway of the machine shop. Shell photo.

Sir William Slim, Australia's Governor-General, officially opened the Geelong refinery in March of this year. Australian government photo.

FIRST OF THE GROUP of modern refineries in which nearly $300 million is being invested to supply Australia's demand for petroleum products was put in operation on March 11, 1954. Its formal opening was a national event presided over by Field Marshal Sir William Slim, Governor General of Australia.

This new processing plant, constructed by Shell Refining (Aust.) Pty. Ltd. at a cost of $22.5 million, is located at Geelong, about 45 miles southwest of Melbourne, capital of the State of Victoria. Geelong is an exceptionally well-equipped port and handles the major part of the export of Victoria's annual crop of 40-60 million bushels of wheat.

It also has large engineering plants operated by such firms as the Ford Motor Co. and the International Harvester Co. as well as textile factories, cement works, canning and wool scouring works. It also is known for its fine schools and technical colleges.

The new refinery is situated on the coast about five miles north of the city itself, occupying a 250-acre site close to the foreshore of Cerio Bay. The ground structure is remarkably stable for such a location, consisting principally of de-

composed limestone with a bearing capacity of over two tons per square foot, which allows the erection of concentrated weight structures, typical of refinery plant, without the necessity of piling. The preparation of the site called for the removal of about 175,000 cubic yards of earth.

Seven companies, five of them Australian, and the other two Dutch specialist concerns, were employed in the construction work. Werkspoor, one of the Dutch companies, is internationally known as a refinery-construction and power equipment firm.

The scheduled capacity of the refinery is 1,800,000 tons per year and it has been designed, up to the present, as a producer of motor fuel, jet fuel, diesel fuel and residual fuel. Shell's earlier-built Clyde refinery near Sydney, Australia, with a yearly throughput of about 500,000 tons, is devoted more particularly to the making of asphalt and lubricants.

At the present time storage accommodation consists of 30 tanks with an overall capacity of about 200,000 tons, but tankage erection is still taking place and the number will be increased to 60 with a total capacity of about 400,000 tons.

The refinery has its own steam turbine driven alternator sets, making it independent of supplies of outside power. Water for the boilers and for use in the treatment processes is drawn from the public supply system and sea water is used in the cooling systems.

To deal with the imported crude from the Middle East and Seria, the Geelong Harbor Trust is building a half-mile long jetty at which ocean-going tankers of up to 18,000 dwt can be accommodated for discharge into crude oil storage. The approaches to the jetty have been dredged to a depth of 32 feet.

Finished products from the refinery will be delivered by sea, road, or through an 8-inch pipe line 36 miles long delivering direct to Shell's main installation at Newport, a suburb of Melbourne, this being the longest pipe line in Australia. It is a welded line, coated with bitumen enamel and glass fibre and is cathodic protected at 1,000-foot intervals, a connected mass of 20 pounds of magnesium having been buried. The pumphouse at the Geelong end of the line and the installation at Newport are kept constantly in touch by a direct teleprinter service.

Both motor spirit and diesel oil will be delivered through this line alternately, and mixing of these products will be avoided by careful pressure control. Delivery capacity when pumping motor fuel will be about 28,500 Imperial gallons per hour (92-100 tons), which is more than double the present consumption rate in Melbourne.

A two-story building of modern design in reinforced concrete and brick has been built to house the administrative and operating staff. The laboratory and laboratory offices are housed in a separate building, containing a shift laboratory, day laboratory and an analytical laboratory, all furnished with modern equipment. Workshops, garages and fire-station are all in keeping with modern refinery requirements.

An amenities block, of the same type of construction as the office, has been provided for the benefit of refinery employees, with recreation rooms, changing rooms, showers and glass-enclosed dining rooms with accommodation for 230 persons. Sun porches are provided for relaxation at meal times.

To accommodate bachelor construction workers, a well-equipped ten block hostel has been built at a cost of £A220,000. Rooms in this block are shared by two men and are all well-furnished. Laundry, drying and ironing facilities are provided in rooms close to the living quarters and modern kitchens with steam and electrical cooking facilities are located close to the living quarters. A separate dining room and a recreation building also have been built.

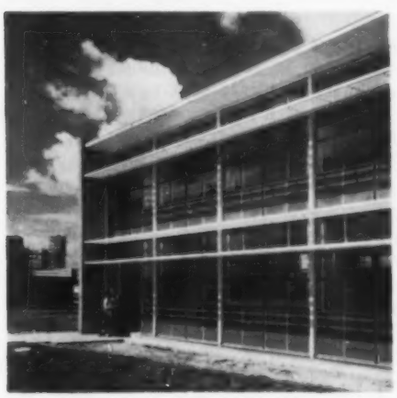
A number of houses to accommodate key staff are to be provided in the refinery area. Of these, the manager's house and four other staff houses have been built and are occupied and five others are in course of construction.

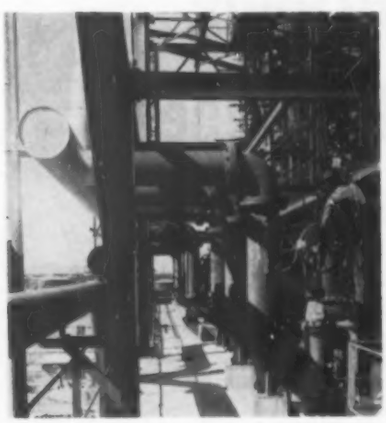
The company is developing a housing estate for other members of the staff at a location about a mile to the west of the refinery. This estate can eventually accommodate 150 houses, of which at present 40 pre-fabricated houses are erected and occupied, while a further 60 two and three bedroom houses are building.

When complete, the housing estate will have a small shopping center and a recreation ground with cricket and football pitches, tennis courts and a swimming pool.

View of columns two, three, and four of the crude distillation unit.

Rear view of the main office block on the site of the Geelong refinery, Australia's largest and most modern.





Pipefitters at work on tower section pipe lines of the crude distillation unit.

The crude oil to be processed will be obtained from the Middle East and partly from the Seria oilfield of British Borneo, both sterling sources of supply.

The crude distillation unit is of Foster Wheeler design to the refinery's requirements and is now on stream producing overhead motor fuel, side stream diesel oils and fuel residue.

In course of construction and scheduled for completion about the middle of 1955 is a catalytic cracking plant with a yearly intake capacity of 650,000 tons (about 130,000 barrels daily), and a feed preparation unit to produce the feed stock for this plant.

As the refinery at present is intended to produce only fuels of various grades, motor spirit is the only product which requires chemical treatment, this being carried out by a "Solutizer" unit, the treated spirit being then brought up to the required O.N. by ethyl-blending.

Recent Trends in Canadian Drilling Practices

By A. S. Murray*

CANADIAN DRILLING practices have kept abreast of recent developments introduced by the oil industry in the United States. One development that has helped contractors maintain fair profits in the face of decreased contract footage rates is jet bit drilling. Jet bits have been used for some time in the United States. Imperial Oil Co. studies have shown that jet bits will increase the penetration rate in both hard and soft formations over conventional bits. Increased drilling rate was found to be a direct function of rotating speed, weight-on-bit, circulation rate, and nozzle velocity. A medium-powered rig using a 250 hp pump is the minimum equipment that can be used to advantage in jet bit drilling. Field experiments indicate that penetration rate increases with nozzle velocity up to a maximum weight-on-bit, at which point balling occurs. It was also noted that there is a critical combination of circulation rate and nozzle velocity that will result in fast drilling and still ensure a clean hole. A study of drilling rate was made with cross-section and tri-cone bits equipped with various nozzle sizes. Rotating speed, circulation rate, and weight-on-bit were varied during the test which was run in many different formations. It has been possible from these data to determine the proper bit and drilling practice for each formation investigated.

Jet bits used with medium- and high-powered rigs have shown substantial increases in penetration rate over conventional bits in most areas of Alberta and Saskatchewan. Leduc field formations are typical of the Canadian plains area. Some of the results of investigations with a 250 hp pump are shown in Figure 1. Penetration rate was increased 34 percent. This represents a saving of eight bits and 2.4 days net drilling time. In the Acheson field, drilling rate was increased 54 percent. This reduced net drilling time of 2.7 days and 10 bits is shown in Figure 2. Similar results have been obtained in other areas.

The mechanics of jet bit drilling with medium-powered equipment are worth a few comments:

1. The highest nozzle power factor (product of circulation rate and nozzle velocity) was carried on all tests. In top hole drilling (Figure 3), penetration rate is higher when emphasis is placed on nozzle velocity rather than circulation rate. The opposite is true when drilling the harder formations below 3,500 feet.

2. Also in top hole drilling, since emphasis is on nozzle velocity, there is a suggestion of insufficient circulation rate with a 250 hp pump to keep the hole clean. By reaming each single down several times prior to making a connection, the pressure surge occasioned by this practice quickly displaces large volumes of cuttings. High speed rotation contributes to fast penetration rate in top hole drilling. The resulting turbulence set up by the drilling string also aids in lifting cuttings.

3. Tooth breakage was common to all types of bits. In top hole drilling, tooth breakage was minimized by the practice of feeling for bottom rather than dropping the bit on bottom as many drillers are accustomed to do when making fast hole. Change of formation often causes tooth breakage by shock loading. On certain rigs where weight and table speed have been carefully controlled, tooth breakage has been practically eliminated.

4. Balling has been noted on some contract rigs. No balling effect has ever been noted on any jet bit tests run by Imperial. The numerous hard sand stringers which are encountered tend to clean the bit and prevent balling. Below 2,000 feet, balling is not a problem.

Most of the difficulties encountered with medium-powered equipment are eliminated when high-powered pumps are available, i.e., greater than 350 hydraulic horsepower. Lack of minimum hydraulic requirements is sometimes overcome by compounding pumps. Compounding power pumps is a relatively new practice in this country. Although there are several disadvantages to compound pump application, we may expect a greater consideration of this practice for jet bit drilling at greater depths in future operations.

Penetration rate has been improved with jet bits through a growing realization that increased weight-on-bit plus jetting action is helpful. Drilling operators over the past year have doubled and in some cases trebled the number of drill collars formerly carried. Seven and 7¾ inch drill collars have replaced 6¼ and 6⅛-inch commonly used in 9-inch hole.

* Drilling engineer, Imperial Oil Ltd. Presented at drilling forum of Oilfield Technical Society, Calgary, Alta., November 25, 1953.

Besides providing additional weight at the bit to improve drilling rate, we have noted that increased stability of the drilling string has reduced dog legs and hole deviation.

Some equipment used on medium-powered rigs could be altered to improve drilling rate. In some instances, the flow line, kelly hose, stand pipe, wash pipe, and other parts of the circulating system are not uniform in size. In other cases, a larger I.D. system would contribute reduced friction losses. Need for improvement in rig equipment is illustrated by the results of one test. In an 8-hour tour, a driller made 1,125 feet of hole in 3.6 hours' drilling. The balance of the tour, or 55 percent of the time, was spent in making connections.

Our conclusions from jet bit experiments are:

1. They have an economic advantage over conventional bits in the formations tested.

2. The lower limit of successful jet bit operations is a 250 hydraulic horsepower pump.

A problem created by fast penetration was rapid bit wear. Jet bits were found to drill faster than conventional bits in top hole sections, but they were not getting footage equivalent to that of conventional bits.

The process of hard-facing and retipping bits was developed in this country 20 years ago. A local welder has revived interest in this practice. The success of his work led a major bit company to develop a similar process to extend bit life. Hard-facing both soft and hard formation rock bits is now common. Our studies show that a soft formation, hard-faced, retipped, jet rock bit will give up to 400 feet more hole before dulling compared to a jet bit that has not been so treated.

Further economies in bit consumption may be affected by retipping teeth with boron carbide, and hard-facing with tungsten carbide.

In some parts of Canada, abrasive, cherty sections and hard quartzitic formation are frequently drilled. Because long sections of these formations are drilled in West Texas, several bit companies worked on the problem of low penetration rate, short bit life, and lost time from tripping at great depths. They developed a bit in which the conventional teeth were replaced by press-fitted hemispherical-ended cylinders of sintered tungsten carbide. Its application is limited to formations of the type mentioned previously. That is, to a formation in which the expected chert content will be 30 percent or greater. Several Canadian contractors have run this bit. Where the formation satisfies conditions for its use, the bit performs with great economy. For example, on one well five conventional hard rock bits were replaced. The penetration rate was equal to that of conventional bits. Data showed that drilling rate did not fall off with bit wear. Eighty percent of the hole was made in hard limestone consisting of 45 to 60 percent chert. An additional advantage realized on the hole was long "on bottom" time (31 hours). This enabled the mud engineer to condition his drilling which had been streaky and difficult to control. Conventional bit life had been three to six hours.

A sintered tungsten carbide insert bit should be used with high weight and slow rotation. It is a spot type bit. The user must recognize the difference between a definitely hard formation and one that is abrasive but poorly cemented. The bit's action is primarily a crushing one and is not suited to the latter condition. For drilling extremely hard, abrasive formations often encountered in foothill, marginal foothill, and northwest Peace River areas, tungsten carbide bits have an economic advantage over conventional bits.

The problem of crooked hole drilling is not a new one in Alberta's oil development. We have learned much since early Turner Valley days. It is currently a subject of intense investigation by drilling study groups all over the world. The problem has been accentuated by an increased trend to greater weight-on-bit which contributes to higher penetration rate. There have been many attempts to reduce or prevent hole deviation. Some of these are briefly summarized:

1. Some form of drilling string stabilization is used by almost everyone. Reduced weight-on-bit lessens drill collar buckling and this increases stabilization, but at the expense of slower penetration rate.

2. Sleeve and roller type stabilizers are often included in the drilling string.

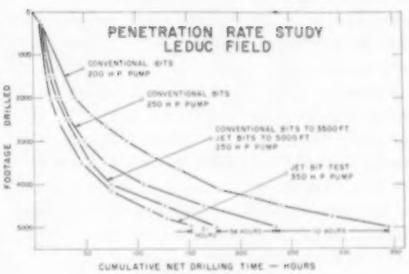


Figure 1.

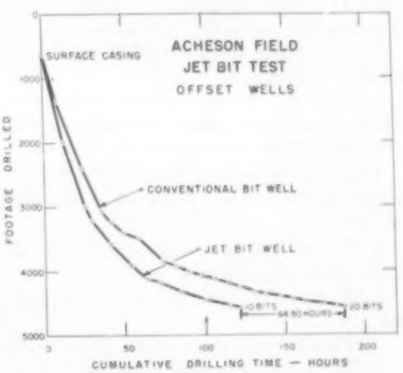


Figure 2.

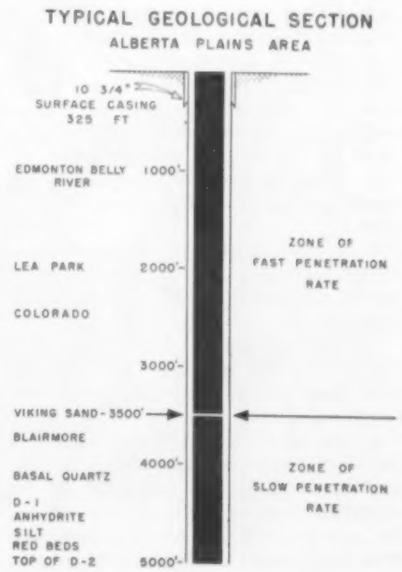


Figure 3.

Sometimes they are placed by a complicated mathematical analysis of drilling string operating conditions; in other instances, they are placed according to signs of wear as evidenced on drill collar strings. A recent West Texas development is the use of large drill collars. Fifteen 7¾-inch drill collars in 8¾-inch hole, or fifteen 7-inch collars in 7⅞-inch hole is common. Although hazards appear great in running these strings, a recent West Texas A.P.I. committee meeting disclosed that no such strings had ever been lost in that area.[1] One string of 7¾-inch drill collars was used in 8¾-inch hole for 20 months without a failure. Its average diameter was 7⅝-inches, which showed that rate of wear was less with larger collars than smaller ones.

Crooked hole drilling techniques are being studied in Canada by a major oil company that operates extensively in the Rocky Mountain foothills region. Because the problem is encountered in other areas of Western Canada (Drumheller, Fort St. John), some methods used by this company to stabilize their drilling string are of interest.

1. Large drill collar strings have been run: 11¼-inch collars in 12¼-inch hole, 7¾-inch collars in 8⅝-inch hole.

2. Sleeve type stabilizers have been run on 7¾-inch collars.

3. Penetration rate studies were conducted to evaluate effect of weight-on-bit, circulation rate, and speed of rotation.

These studies are continuing. Sufficient work has been done to permit a few observations:

1. Penetration rate was doubled where large drill collars were run.

2. Bit consumption was reduced 50 percent.

3. Elapsed time was reduced 50 percent.

4. There was a greater constant deflection from carrying greater weight-on-bit. It is believed that this deflection was minimized from that which would have been expected if a conventional collar program were followed with equivalent bit weight. Dog leg effect was reduced in the larger hole, e.g. rate of change of hole angle with depth was reduced from an average of 5° per 100 feet to 1° per 100 feet.

5. Where drift could be reasonably estimated, it was compensated for at the surface.

6. A lubricating type of mud such as oil-emulsion is essential to reduce high torque required for rotation of large drill collars.

7. High annular velocities are a requisite for keeping hole clean when drilling with large collars. (180 feet per minute is minimum).

8. Jet bits have contributed greatly to increased penetration rate and to reduced bit consumption. A successful jet bit operation requires a circulation rate of 900 gpm at 1,600 psig for 12¼-inch hole. This requirement is considerably reduced when drilling a smaller hole.

9. When drilling a 12¼-inch hole, 20,000 to 40,000 pounds were carried on the bit, which was rotated at 180 to 200 rpm. For 8⅝-inch hole, the same weight was carried. Rotation was 150 rpm. As depth increased, rotating speed was gradually reduced to 80 rpm. Ninety feet of 11¼-inch collars and sufficient 7¾-inch collars to keep the string in tension were run with 5½-inch drill pipe when drilling 12¼-inch hole.

We may expect improved techniques for preventing crooked hole in the future. Already, interest has been shown by Canadian operators as evidenced in the recent formation of an Oilfield Technical Society Bore Hole Deviation Study Group.

Many Canadian oil companies are faced with having to evaluate large mineral reservations cheaply and quickly. Impetus was given to the slim hole drilling technique in a recent A.P.I. paper presented by a major oil company operating in Midwestern United States.[2]

A number of Canadian operators have experimented with slim hole drilling in the plains areas. Our industry has not done enough work to evaluate this method. Here are a few general observations which have been collected from a number of sources:

1. Penetration rate is extremely low.

2. Bit consumption is high.

3. Elapsed time from spud to rig release is greater than for a standard hole.

4. In one case, rig investment was equal to that of a standard rig.

5. Because elapsed time has been high, there is a questionable saving in diesel fuel, water, and drilling mud.

Since slim hole drilling is in its infancy here, we feel that further experiments are warranted under all types of geological conditions so that its practice may be proved or disproved. Although few data are available at present to support its use, we think that slim hole drilling has a future. This future may be in foothills or marginal foothills drilling where large rigs are required and elapsed time is excessive. It may also have application in isolated northern areas where transportation is an important factor.

The potentialities of diamond drilling are yet to be evaluated in Canadian operations. More effective and economical means of penetrating a hard, thick section of fine-grained tight Weber sand led major oil companies in Rangely, Colo. to experiment with diamond bits. Since that time diamond bit development has been rapid. Several deep foothill wells established their effectiveness when run under proper conditions. One well drilling 6⅛-inch hole with conventional hard rock bits averaged 29 feet per day at approximately 9,900 feet. Six-inch diamond bits made 222 feet in five days, averaging 44 feet per day in the same well and formation. In other instances, our data show that several runs of over 500 feet in 132 continuous hours of drilling at around 10,000 feet have been made with 6⅛-inch diamond bits. This record was made in a formation that conventional hard rock bits drilled at two feet per bit, and two hours on bottom. Saving in drilling time, equipment wear, and increased penetration rate is obviously large on deep foothill wells.

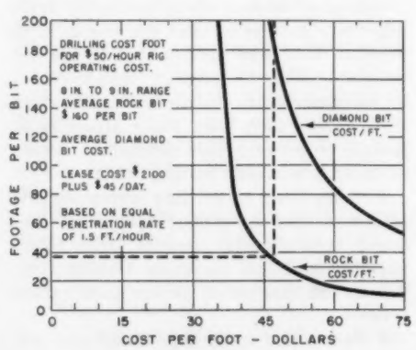


Figure 6.

Diamond bit drilling requires close control. Constant weight-on-bit, table speed, feed off, and uniform circulation rate are necessary for best results. The hole should be clean, particularly free of junk, and to gauge.

The question of when to change from conventional to diamond bit drilling is often asked. The answer may be suggested by the following:

$$C = \frac{B + R\,(T + t)}{F}$$

C = drilling cost (dollars per foot)
B = bit cost (dollars)
R = rig operating cost (dollars per foot)
T = drilling time (hours)
t = round trip time (hours)
F = hole drilled by bit (feet)

The formula evaluates drilling cost in dollars per foot. You will note that bit cost plus other factors are included in computing a final drilling cost, e.g. rig operating cost, drilling time, and round trip time. Figure 6 assumes hypothetical values for each unknown. A plot of these values for a series of conditions gives the curves.[3]

Referring to a particular instance, you will note that when conventional rock bit footage falls to 38 feet per bit, the economics of running a diamond bit should be considered. At this rate, a diamond bit would only have to make 186 feet to be comparable costwise.

We think that diamond bits will contribute to cheaper drilling as deeper and harder formations are encountered in the basin and foothills areas.

Rapid expansion of Canadian drilling operations from 1947 to present have necessitated replacement of much rig equipment which has been operating full time at high speed. Contractors generally have kept abreast of the latest drilling practices and equipment. Air casing and tubing tongs are gaining in popu-

larity because of better pipe care and savings in rig time, as well as their safety and labor-saving features. Rotary table torque indicators are appearing. They help determine when a bit should be pulled. When used with large drill collars, their information is invaluable. With increasing use of jet bits and a trend to deeper drilling, larger power pumps and diesel engines are being purchased. To reduce moving costs, rig portability is receiving attention. A few drilling feed off controls are being used. Hydraulic couplings or torque convertors are built into over 50 percent of the models being offered by manufacturers. Drilling masts of various designs have almost completely replaced conventional derricks. Tong torque gauges, pump pulsation dampers and engine speed selector gauges are gadgets often found on Canadian drilling rigs. Grooved drums are almost standard on drawworks sold today. Grooving has been installed on many of the older rigs. This has doubled or trebled in some instances ton-mile yield to rotary drilling line. Slush pump parts have been continually improved over the past few years. Today we are doubling the service records of valves, seats, rods and heads.

A few other trends have appeared in Canadian drilling operations that are suggestive of future drilling practices and equipment. Deeper drilling is requiring a wider use of automatic drilling equipment to reduce hole and personnel hazards. Air or gas drilling may become common as more geological information is available to indicate areas where it can be used economically. One test has already been run in Canada where air was the circulating medium. The test indicated that bit consumption was reduced and penetration rate increased. These favorable data merit study of air drilling techniques. Butane and gas-powered engines may compete with diesel engines. A few LPGas and natural gas engines are currently in field use in Canada.

The plains area of Canada is one of the most fertile areas left in North America for oil exploration. Our present progress had hardly begun to investigate its potentialities. The rapid expansion of operations from 1947 to 1952 has been replaced by a more stabilized drilling industry which will benefit from the healthy stimulation of competition. With competition among contractors, we may expect our drilling practices and equipment to show continued improvement in the form of reduced drilling costs and time.

REFERENCES

[1]Johnston, D. and Johnston, W. R., "Current Drilling Practices in West Texas," *The Petroleum Engineer*, p. B-73, April 1953.

[2]Burgess, G. and Hoopman, H. D., "An Experiment in Core Hole Drilling in Western Nebraska," paper presented at the Spring Meeting of the Rocky Mountain District, A.P.I., Division of Production, Casper, Wyoming, May 7-8, 1953.

[3]Sanna, J., "Diamond Drilling Bits May Lower Costs in Drilling Hard Formations," *The Oil and Gas Journal*, p. 127, December 15, 1952.

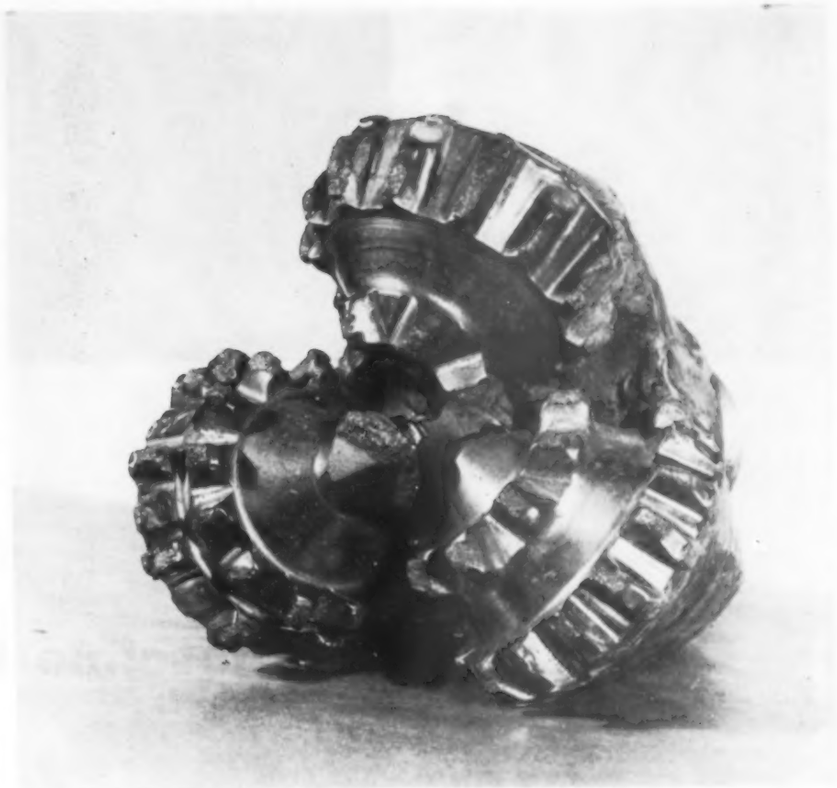
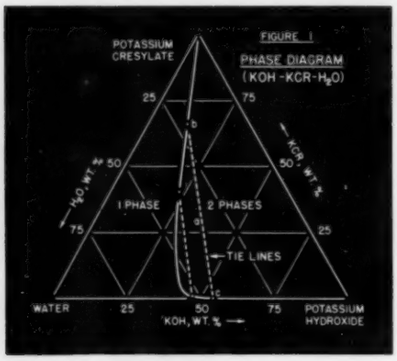
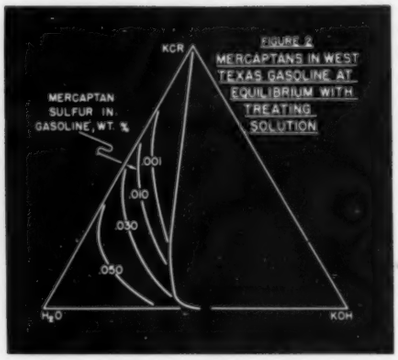


Figure 4. A Western Canada shop is retipping broken rock bit teeth with boron carbide and hard facing with tungsten carbide.

Figure 5. New type bit with press-fitted hemispherical-ended cylinders of sintered tungsten carbide for use in abrasive cherty sections and hard quartz.





DUALAYER gasoline treating process

EXTRACTION OF MERCAPTANS from petroleum products is preferable to their conversion to disulfides because of the reduction in sulfur content of the treated distillates. Disulfides left in the oil may be even more harmful to oil quality than the original mercaptans[1]. The importance of complete removal of mercaptans from gasoline as compared to their conversion to disulfides may be visualized from data in Table I (p. 62).

These data show that in treating gasolines normally encountered at a refinery, savings of $160 of TEL per thousand barrels are not unusual because of an increase in the octane number of the leaded gasoline. In many instances considerably greater savings can be obtained, depending on the quantity of mercaptans present and the desired octane number of the product. The Dualayer process secures a doctor sweet product by extracting mercaptans and not converting them to disulfides.

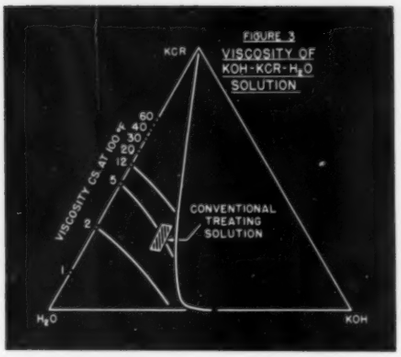
Mercaptans are acidic and alkalies react with them. However, alkalies alone are seldom capable of extracting all mercaptans, with the possible exception of the lightest members of the series. Complete removal of mercaptans from petroleum distillates with conventional aqueous alkali hydroxides is attained only in very rare instances.

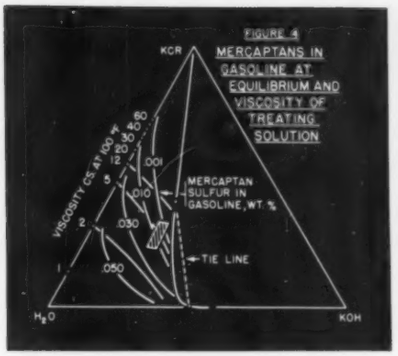
The addition of organic acids, referred to as solutizers or solventizers[2], improves the mercaptan extraction efficiency of aqueous alkali hydroxide solutions. However, improvement obtained by existing processes is seldom adequate to insure sufficient removal of mercaptans to give products sweet to the doctor test.

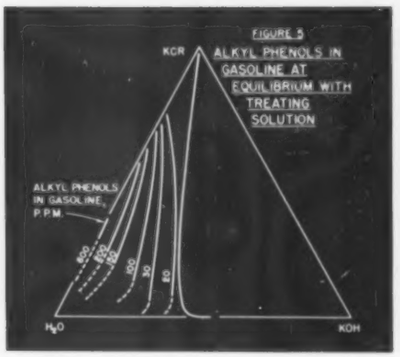
Investigation of caustic solutions containing organic acids revealed that at certain concentrations two immiscible layers are formed which are also immiscible with the oil. Commercial processes now in use employ one-phase solutions of composition fairly remote from this critical region in order to avoid such separations. The new process developed at the Magnolia Petroleum Co. utilizes the two layers and is referred to as the Dualayer (dual layer) process. The principles on which the process is based are applicable to a large variety of systems involving alkali hydroxides, water and organic substances. For illustrative purposes the system consisting of potassium hydroxide, water and cresylic acid was selected.

Potassium hydroxide has a considerable advantage over sodium hydroxide for extraction of mercaptans. On account of their low viscosity, potassium hydroxide solutions can be used commercially in highly concentrated form. The mercaptan extraction power of these concentrated solutions is high. Losses of potassium hydroxide due to entrainment are less than with sodium hydroxide because of this difference in viscosity. For this reason, in regenerative processes, the cost of potassium hydroxide is usually less

[1] Hanson, T. K. and Coles, K. F., J. Inst. Pet. 33, 589-97 (1947).
[2] Kalichevsky, V. A., Petroleum Refiner 30, Np. 4, 111-7 (1951).







By C. A. Duval and V. A. Kalichevsky*

than that of sodium hydroxide and the extractive power is greater.

Cresylic acid is a mixture of acidic organic substances present in the petroleum distillates from which the mercaptans are removed. Caustic solutions extract these compounds and no outside source is normally required to supply them to the process. In the few instances where distillates are deficient in these acids, they may be obtained from treating other refinery stocks. Composition of cresylic acid from petroleum varies with the nature of the distillate, but these variations are minor and do not affect the efficiency of the process.

Three-component systems are conveniently represented by triangular diagrams. A typical diagram for a potassium hydroxide, water and potassium cresylate system is given in Figure 1. In this instance cresylic acids extracted from catalytically cracked gasolines were employed. Cresylic acids from other sources may slightly affect the position of the boundary line separating the one- and two-phase regions. The tie line *a* on the diagram shows the composition of the two layers if the total composition of the mixture corresponds to any composition intersected by the line. The actual compositions of the two layers are represented by the points *b* and *c*.

In choosing the most desirable composition of the treating solution for commercial use, several factors must be taken into consideration. The most important of these are the extractive power for mercaptans and viscosity.

Extractive power of solutions for mercaptans may be visualized from concave curves on Figure 2. They show that the extraction efficiency improves as the curves approach the two-phase region. It also improves with the change in composition of the treating solution as it nears the KCr apex of the triangular diagram given in Figure 2. In the diagram, KCr is used as an abbreviation for potassium cresylate and H_2O and KOH are the conventional chemical symbols for water and the uncombined potassium hydroxide.

Viscosities of the solutions are represented by the convex curves on Figure 2. Viscosities decrease as the curves approach the H_2O apex on the diagram. Separation of treating solution from the treated distillate is a function of the viscosity of the treating solution. Good separation is obtained with solutions having viscosities below 12 centistokes at 100°F. Solutions of considerably higher viscosity can be used successfully with proper mixing and settling equipment and with continuous filtration of the solution to remove impurities.

Figure 4 shows that for a given viscosity the highest extractive efficiency is obtained by a solution having a composition on the two-phase boundary line. This is true for viscosities above five centistokes at 100°F. Extractive efficiency and viscosity lines in Figures 2 and 3 are superimposed in Figure 4.

Equilibrium curves for cresylic acid concentrations in the treating solution and in gasoline are shown in Figure 5. These curves are important for calculating the amount of cresylic acids introduced with the fresh distillate that will be absorbed by the treating solution or released to the distillate.

The shaded regions on Figures 4 and 5 represent compositions of conventional treating solutions recommended for use commercially at the present time. It may be seen that the ultimate ability of these solutions for extracting mercaptans has not been utilized. This is also demonstrated by the data presented in Table II (p. 62) on mercaptan extraction by the Dualayer and conventional solutizer solutions from a West Texas straight-run gasoline.

The data are presented on percentage basis for better visualization. The 100 percent removal of mercaptans corresponds to a product sweet to the doctor test and containing less than 0.0005 weight percent mercaptan sulfur.

The tabulated data show the ease with which the mercaptans are removed from the oil by the Dualayer process. With the conventional treating solutions the doctor sweet products could not be obtained even by raising the solution to distillate ratio more than twenty times above that employed in the new process.

The exceptional performance of the Dualayer process is due to the fact that the potassium hydroxide, potassium cresylate and water content of the treating solution are completely under control. Treating solution composition on

* Technical Dept., Refining Div., Magnolia Petroleum Co.

conventional solutizer units is normally out of control and reaches an unfavorable equilibrium for mercaptan extraction. The water content or boiling point of the solution is usually the only method used to adjust composition, and the potassium hydroxide to potassium cresylate ratio varies until it reaches equilibrium with the organic acids in the oil. The resulting solution is deficient in potassium hydroxide and is relatively ineffective for the extraction of mercaptans. High treating ratios and large strippers are required with this type of solution for even partially satisfactory results. In the Dualayer process the water content and the potassium hydroxide content are both controlled. The water content is controlled by the stripper temperature and the potassium hydroxide content by the equilibrium with the potassium hydroxide-water layer in the equilibrium drum. Since the solution consists of only three major components, control of two of them automatically controls the third. In other words, the Dualayer solution has only one degree of freedom and the stripper temperature controls its composition. Conventional solutions, with only one homogeneous phase, have two degrees of freedom and cannot be controlled satisfactorily by the stripper temperature alone.

Regeneration of the Dualayer solutions is easy. Less than ten pounds of steam per barrel of gasoline charge was needed in the pilot unit to remove mercaptans from the treating solution used in the experiments reported in Table II. Several modifications of the regeneration procedure are possible. The co-existence centrations shows that either of the two of three layers, gasoline, potassium hydroxide and potassium cresylate in equilibrium with respect to mercaptan conalkali layers will reduce the mercaptan content of the gasoline. However, the favorable equilibrium conditions are established on account of the tremendous absorptive capacity of the potassium cresylate layer for potassium mercaptides. In the absence of the potassium cresylate layer, mercaptans distribute relatively evenly between the gasoline and potassium hydroxide solution and their extraction becomes difficult. If the spent potassium hydroxide solution from treating is brought in contact with the potassium cresylate layer, mercaptans are absorbed by this layer and the potassium hydroxide solution regenerated.

Regeneration of mercaptans from the potassium cresylate layer is accomplished by diluting with water and steam stripping the diluted solution. Since the required potassium cresylate to gasoline treating solution dosage is very low (in some cases as low as 2 volume percent), only a small quantity of water is required to provide very dilute solutions for stripping. The advantages of stripping dilute solutions may be visualized from Figure 2. The ease of stripping is inversely proportional to the mercaptan extraction ability of the solution and water dilution reduces the mercaptan extractive power of the solution.

TABLE I

TYPICAL TEL SAVINGS BY DUALAYER PROCESS

Gasoline	Octane, R-39 + 3cc TEL Doctor	Dualayer	TEL Savings*, $/1000 Bbls.
Absorption	84.0	85.6	90
Thermal ...	83.2	86.0	160
Straight-run	85.9	87.2	70

* TEL @ .231c/cc

TABLE II

MERCAPTAN REMOVAL BY DUALAYER AND SOLUTIZER SOLUTIONS

Treating Solution	Solution To Gasoline Ratio, Vol.	Mercaptan Removal, % One Stage	Two Stages	Three or More Stages
Dualayer ...	0.02	91	100	100
Solutizer ...	0.20	71	80	93
	0.40	84	93	96

Note: Initial Mercaptan Sulfur = 0.110 Wt. %.

A typical flow diagram for a commercial process is shown in Figure 6. It is only one of the possible variations of the flow of materials which was found to be the best for solving a particular refinery problem. Gasoline distillate containing mercaptans enters two-stage countercurrent extraction system A. The small quantity of the treating solution employed favors the use of mixing and settling stages in preference to tower extraction. The doctor sweet gasoline is pumped to storage and the spent treating solution is diluted with an equal volume of water and settled in equipment now shown to remove small quantities of entrained gasoline. The diluted solution is directed to the regeneration tower B equipped with closed steam coils. Water, added to the treating solution in the previous step, is converted into stripping steam by the closed steam coils. It is removed as a liquid on the water separation tray in the upper portion of the column and used for diluting the stream of the spent solution.

Vapors from the stripper are condensed and the mercaptans are withdrawn from the system at C. The water layer is returned to the top of the stripper tower. The lean treating solution is blended with a small quantity of 50°Be′ potassium hydroxide solution and fed to the Dualayer equilibrium drum D. The two layers are separated, and the top layer, which contains the potassium cresylates, is used as the treating solution. Small quantities of potassium cresylate solution may be withdrawn from the system if excessive quantities of cresylic acid are present in the raw gasoline distillate. The unit described above is now under construction at the Beaumont refinery of the Magnolia Petroleum Co.

The use of the Dualayer process is not limited to gasoline, but can be applied successfully to the refining of considerably heavier petroleum distillates such as kerosine, and distillate fuel oils which are not treated satisfactorily with conventional mercaptan extraction processes.

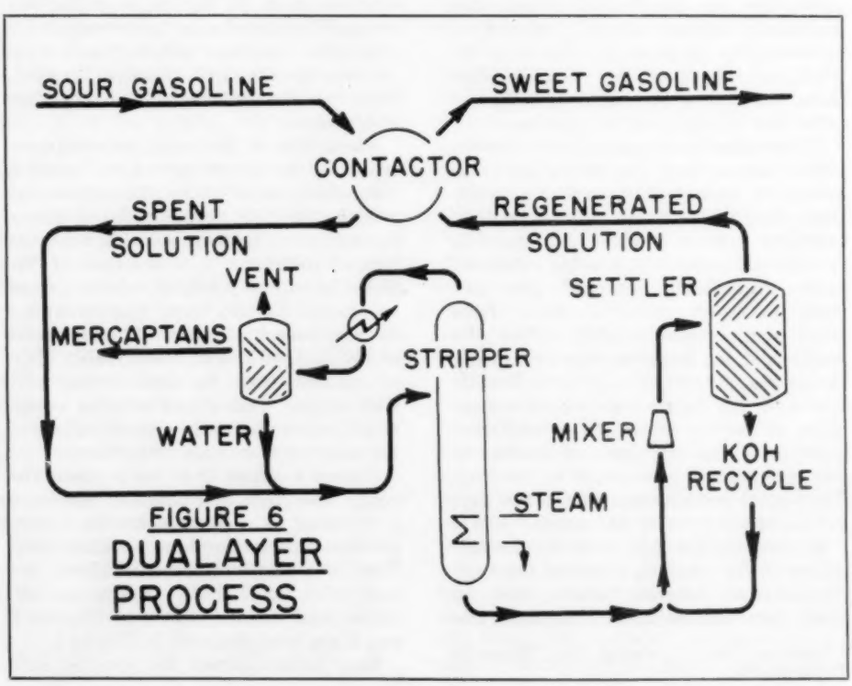


FIGURE 6
DUALAYER PROCESS

From first experiments in 1913
to worldwide service in

Schlumberger 1954

developments have kept pace with
the oil industry

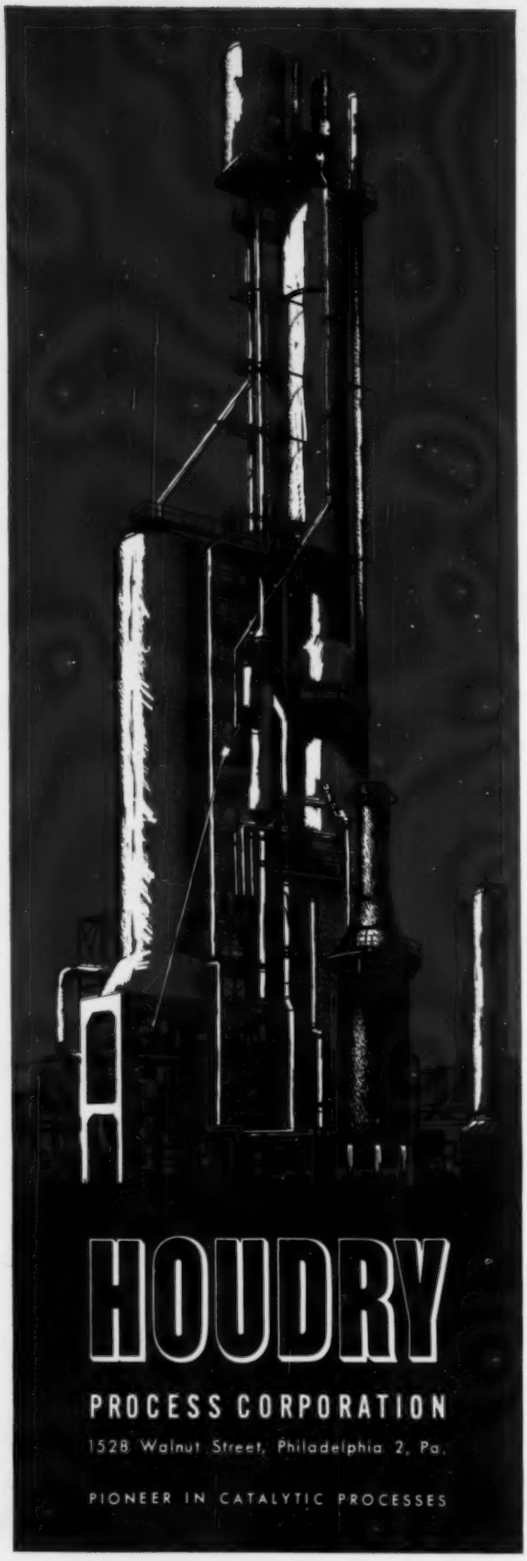
It lighted our
lamps it
now powers the world

HIGHEST CONVERSION RATES IN REFINING HISTORY!

Extensive commercial operation of Houdriflow Catalytic Cracking units has proved that they achieve conversion rates previously unobtainable. A west Texas Houdriflow charging heavy vacuum gas oils has exceeded 90% conversion of the charge stock—a world's record. Only 3 to 4 percent of the original crude remained higher boiling than the Houdriflow charge stock.

In addition to record-breaking cracking efficiency, Houdriflow units have shown exceptional mechanical reliability. Turnarounds of units which have been on stream over two years have revealed minimum maintenance requirements.

A request on your letterhead will bring you a new brochure describing the Houdriflow process in detail. Flow diagrams and economics are included.



HOUDRY

PROCESS CORPORATION

1528 Walnut Street, Philadelphia 2, Pa.

PIONEER IN CATALYTIC PROCESSES

INTERNATIONAL LICENSORS: WORLD COMMERCE CORPORATION, S. A.

25 Broad Street, New York 4, N. Y. With Representatives In:

BRAZIL ENGLAND FRANCE

GERMANY ISRAEL ITALY JAPAN

PANAMA SPAIN SWITZERLAND

CHILE'S growing petroleum industry

By Dr. J. E. Rassmuss

UNDER THE GUIDANCE of Empresa Nacional del Petroleo, created in 1950 as an autonomous government agency, Chile's petroleum industry is making good progress. Although the organization has not attained its goal of supplying the domestic demand for petroleum products and considerable development of new reserves is still required, results obtained are highly encouraging.

Oil production in Chile has almost doubled in the past 12 months, rising from an average of 2,486 b/d in 1952 to 4,647 b/d in December 1953. Total output for 1953 amounted to 1,258,736 barrels against 909,773 in the preceding year. Present capacity is estimated at 6,300 b/d, sufficient to supply one third of the requirements of the new national refinery which is being built in Concon and is to be put on stream in August of this year.

Wells drilled in the Magellan fields up to the end of 1953 reached a total of 122, of which 53 struck oil, 25 gave gas and 44 were dry. All wells are flowing, and for pressure maintenance a gas plant was established in 1952 at Manantiales to recover the condensate and to reinject the dry gas into the oil sand. In Manantiales, the first discovered pool, injection of 10 billion cubic feet of dry gas is calculated as needed to restore the initial pressure. A considerable number of producing wells are therefore shut in, and in December 1953 only 16 oil wells and six gas wells were on production, giving an average output of around 300 b/d per well. Yield of the wells varies from 120 to 1,000 b/d.

Five rotary rigs were active in the fields and 30 wells were completed in 1953, of which 13 yielded oil, three gas and 14 were dry. Total footage drilled was 225,485. Exploratory drilling is regularly carried on to test new structures located by seismic surveys. Out of 30 wells completed, 12 were exploratory tests, and of these, two gave oil, two gas and eight were dry. Two seismic crews, one of the Empresa and one of United Geophysical Co., are working continuously. Exploration has led to a considerable extension of the field on the island of Tierra del Fuego, but on the continent oil has been found so far only at Punta Delgada, opposite the original Manantiales discovery.

All oil and gas is produced from the Cretaceous Springhill sands at 6,300-7,600 feet. The oil sand occurs in irregular lenses and reaches a thickness of 130 feet. Porosity, averaging 20 percent, and permeability are variable. Six pools have been developed on the island and one on the continent with the following number of wells:

	OIL WELLS	GAS WELLS
Manantiales	18	8
Sombrero	15	—
Victoria Norte	1	3
Victoria Sur	14	2
Side	1	—
Chillan	3	—
Pta. Delgada	1	2

Gas wells have been drilled in Chanarcillo (3), Chanarcillo Sud (1), Pta. Baja (2), Espora (1), Angostura (1), Sara (1), and Manzano (1). A gas line 19 miles long, of 6⅝-inch to 8⅝-inch diameter, conveys the wet gas from the southern fields to the gas plant at Manantiales. A parallel 6⅝-inch pipeline transports the oil to Manantiales, whence it runs by an 8-inch pipe line to the embarkation point in Bahia Clarencia, 42 miles distant. The gas plant at Manantiales recovers about 600 b/d of natural gasoline. A topping plant of 500 b/d produces gasoline, kerosine and diesel oil for local consumption in the Magellanes region.

The national refinery, located in the middle of Chile at Concon, north of Valparaiso, is expected to be put in operation in August. Constructed by the M. W. Kellogg Co. at a cost of $8.5 million plus 800 million Chilean pesos, it consists of a topping plant of 20,000 b/d, thermal cracking plant of 6,300 b/d and units for recovery of propane and butane, gasoline treatment and stabilization. In Quinteros bay a marine terminal has been constructed for receiving tankers from Magellanes, connected with the refinery by an 8-inch pipe line 10.5 miles in length. An 8-inch line, six miles long, conveys the products to the tanks of the distributing companies in Salines north of Vina del Mar. Product lines are projected to Valparaiso and Santiago and the installation of a gas reforming plant is being considered to utilize the refinery gas for consumption in the gas manufacturing plants of those cities, in order to save about 200,000 tons of coal consumed yearly in these plants.

Chile's domestic consumption amounts to around 23,000 b/d and involves expenditure of some $33 million yearly for the import of oil products. The crude of the Magellan fields has been exported to the ANCAP refinery in Uruguay, commanding a price of $3.22 per barrel, fob Clarencia, because of its high quality.

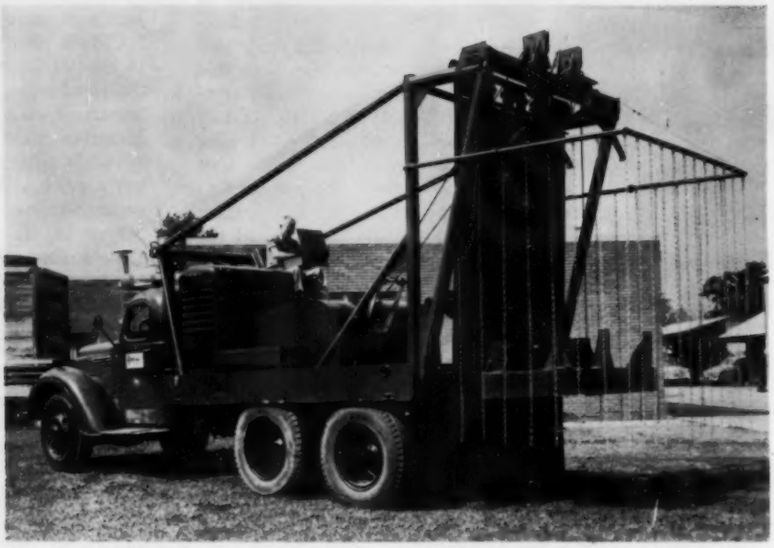
Due to its well organized planning, Chile's Empresa Nacional del Petroleo has been successful in creating a national oil industry, but to assure a yearly output of 10 million barrels needed for domestic demand in coming years, reserves of 300 million barrels will be required. Counting a maximum recovery of 60 percent of the oil in the ground, proven reserves should be increased to 500 million barrels.

From an economic angle, some interesting conclusions may be drawn from the results of oil development in different countries. In countries where private enterprises have undertaken development, as in Venezuela, Colombia, Peru and Ecuador, oil is exported on a major or minor scale and its production and marketing add considerable revenues through royalties, export and import duties, surface rentals and income taxes to the national income and provide besides an important share of dollar exchange. In such countries, the domestic prices of gasoline and other products are extremely low, ceilings generally being set by the governments, reaching in Venezuela (and especially Peru) probably the lowest levels in the world. Supply for the domestic market is kept ample and contributes essentially to the development of national industries.

In countries where state monopolies govern oil exploitation, as in Argentina, Brazil and Chile, production so far has failed to satisfy domestic demand. In Argentina, where oil has been developed for 40 years, local production is supplying 40 percent of domestic consumption. Gasoline and product prices in all of these countries are high, depending upon the import prices and the exchange rate. Supply for the domestic market is often restricted and occasional rationing has even been introduced in Argentina and Brazil. Besides, the preferential exchange rate applied generally to oil imports is detrimental to the balance of trade and consumes a part of the foreign exchange obtained by other products.

The ambitious program of the Corporation de Fomento in Chile, not only applied to the oil industry, exceeds the financial capacity of the country and consumes a large share of the national income, contributing in considerable scale to the rapidly increasing monetary inflation.

Geograph provides new exploration technique



A NEW SEISMIC METHOD of exploration known as "The Geograph" has been announced by McCollum Exploration Co. It represents the culmination of 15 years of experimental and research work conducted under the direction of Burton McCollum, president of the company.

The new method was developed with the primary objective of obtaining better reflection in areas having hard rock on or near the surface, such as the Edwards Plateau of Texas, the Anadarko Basin of Oklahoma, Southern Alabama and possibly Florida. In the past it has been a difficult and expensive matter to obtain usable reflections in these areas due primarily to the fact that the horizontal reverberations from a charge of dynamite are far in excess of, and tend to obscure, the reflected energy.

This new method has been used successfully for the past eight months in the difficult cavernous-lime and hard rock areas of several counties in the Edwards Plateau.

The heart of the system is an integrating recorder. This recorder is used in conjunction with a weight-dropping truck which drops a 3-ton weight as a source of seismic energy.

The weight is five feet long, three feet wide and eight inches thick. It is dropped from a height of approximately 9½ feet. The recorder integrates the feeble reflected events and tends to suppress the horizontal traveling energy.

The advantage of the integrating recorder over the conventional seismograph using pattern shooting is that the weight can be dropped over a much larger area and therefore obtain a better cancellation of the horizontal-traveling energy which normally obscures the reflected energy in these difficult areas. This is made possible since the integrating recorder has embodied in it essential auxiliary techniques that allow compensation for numerous variable geometric effects in the case of drops made at different distances.

A typical field procedure with this new method is to place a pattern of 64 geophones, more or less, approximately in the center of a profile line one mile in length. The weight truck starts at one end of this line and drops the weight at intervals of 25 to 75 feet along this entire mile of line. The weight is raised by the operator on the weight truck, but is released automatically by the recorder in the instrument truck. Each impact made by the falling weight is recorded magnetically on a sound track and each impact is made at a different location. It is not necessary that the weight truck drop the weight in a straight line. It can veer around rough spots or trees, as there is nothing critical about the exact location of any one drop. After the mile of line has been traversed by the weight truck, the integrating recorder operator can combine a group of drops and also make a composite of all drops. If a photographic record of this composite of drops does not have the required character, then a second mile of line can be used approximately parallel and several hundred feet to one side. Then this group of drops can be combined with the first group to give a more effective elimination of horizontal traveling energy. This procedure can be continued as often as necessary to obtain the desired results.

In certain areas it has required as many as 200 drops of the weight to obtain a usable record, whereas in other areas only 20 to 50 drops have been necessary.

It should be pointed out that the integrating recorder can be used without the weight-dropping technique. Normal shotholes and explosives could be used, but in the hard rock areas the cost of drilling shotholes and using explosives would be prohibitive. It is estimated that the integrating recorder with the weight dropping equipment can be used in a hard rock area at a cost of approximately 50 to 60 percent of the cost of using conventional equipment with pattern shooting. This saving is due primarily to the fact that there are no drilling or explosive costs, and operational time is reduced.

To date, very little exploration work has been done along the same profile lines that have been explored by the conventional method with pattern shooting. It is therefore premature to give an accurate direct comparison of the "Geograph" with conventional methods. However, the evidence to date indicates that it is possible to secure better reflection records with the "Geograph" and better correlation with known sub-surface data.

The "Geograph" method has been tried experimentally in the Gulf Coast area of Texas and has yielded reflections with much fewer drops than needed in hard rock areas. It is quite possible that the new method will have uses in a much broader field than that for which it was originally designed. However, the extent of its field of usefulness will have to be determined by future use.

Oil harvest

IT'S AN OIL HARVEST these days. Without oil many more men and horses would be needed to reap the world's rich harvests.

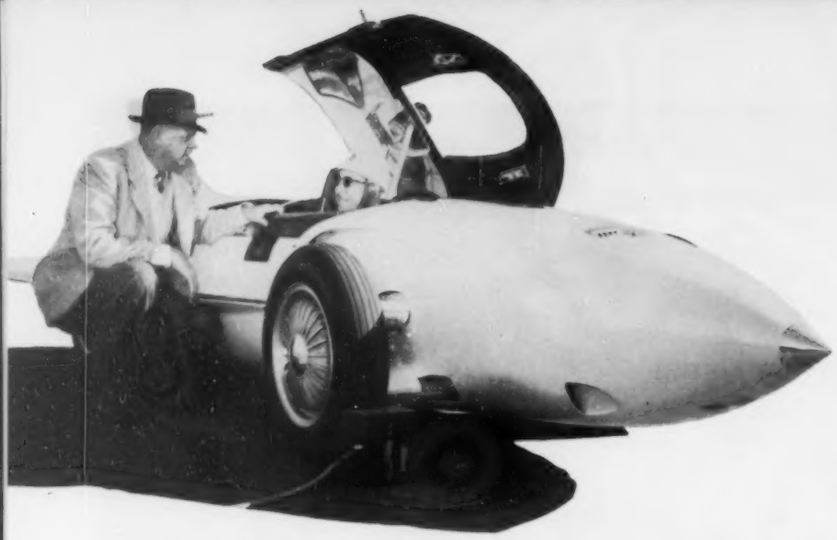
Anglo-Iranian is finding — and refining — more and more oil each year. Two new refineries are building and new plant speeds production at existing refineries. Total capacity will rise before long to a figure of about 600,000 barrels a day.

Anglo-Iranian is turning oil into power; helping farmers all over the world to bring home bigger and better harvests.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company

LIMITED



The first gas turbine automobile in the United States, General Motors' XP-21 Firebird. Designer of the car's unique aircraft-type fiber glass-plastic body is Harley J. Earl (left), GM vice president in charge of styling staff. In the cockpit is the car's first test driver, Mauri Rose, Chevrolet engineer and three-time Indianapolis Speedway champion.

More power, style in 1954 autos

FOR THE FIRST TIME since the war the auto industry in the United States finds itself in a buyers' market. This trend became apparent last year, and to meet the challenge, Detroit began offering such eye-catching innovations as the sports car for the growing band of foreign car enthusiasts, and for the family market it introduced (in some instances) advanced styling by European designers. Even greater buying resistance is apparently expected in 1954, and each manufacturer is readying himself for the mounting competition he sees lying ahead.

The boldest approach to the future has been made by General Motors, which has announced it will spend $1 billion on expansion. This, it should be noted, will make $3 billion that General Motors will have put into expanding and improving its facilities since the war's end. Ford, the second largest auto producer (1,500,000 units in 1953 compared with 3,500,000 made by General Motors), is also meeting the challenge of competition by expansion and has earmarked $500 million for this purpose in 1954. Ford's long range plans call for an increase in its line of cars and a determined effort to supplant Chevrolet in first place in sales. The real battle with Chevrolet is expected in 1955, for that is the year Chevrolet is scheduled to bring out its V-8 engine. However, Ford has taken cognizance of the plastic Corvette, Chevrolet's entry in the sports car field, and has announced it will be in production with the Thunderbird late this year. The Ford Thunderbird is a low-slung, steel-bodied roadster, with a plastic top and an adjustable steering wheel that can be raised or lowered to suit the driver's convenience. Engine will be a 160 hp V-8.

It seems assured that 1955 will mark the resumption of manufacture by Ford of the fabulous Lincoln Continental, one of the most beautiful cars of all time. The new Continental will, of course, be the top of the Ford line and will, it is reported, be in the $10,000 price class. A newcomer to the Ford family, it is rumored, will be the "Fairlane," a Ford entry in the upper medium price bracket designed to compete with the Buick. Visitors to the auto shows in Paris and London last fall will recall the Ford X100, an experimental car. It is expected that many of the innovations in the X100 will appear in the Thunderbird.

Chrysler still remains a big question mark so far as its plans for the future are concerned. Since the war it has followed an ultra-conservative policy with regard to styling. Engineering-wise, Chrysler, on its Chrysler, Dodge, and DeSoto lines, has been progressive, introducing V-8 engines. The 1954 Chrysler New Yorker uses a new V-8 engine with overhead lateral valves; this engine develops 235 hp at 4,400 rpm, making it the most powerful car on the road today. In spite of these engineering advances, Chrysler's sales have been slipping and it is evident it will have to change its policy if it is to retain its position as number three in the industry. In 1953 it exhibited some experimental sports models, and in 1954 it is showing the experimental Plymouth Belmont and Dodge Firearrow, and DeSoto has been displaying its Ghia-designed Adventurer. Perhaps these exhibit models are the forerunners of the Chrysler line of the future. For 1954, however, the Chrysler line of cars shows little outward change from previous years.

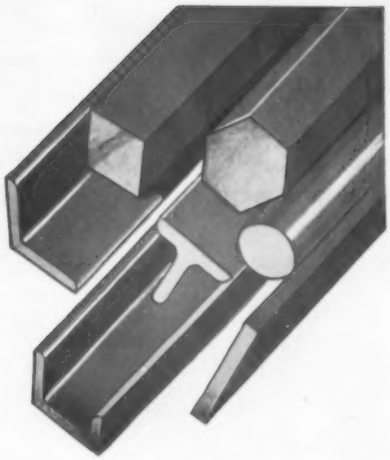
An eye-catching feature of the recent GM show of 1954 cars was the experimental XP-21 Firebird, the first gas turbine powered passenger automobile in the United States. This automobile, which has a cockpit and embryonic delta wings, is suggestive of the latest research aircraft, and holds little promise as a road vehicle—at least for the near future. The airfoils, it is not surprising to learn, serve a purpose, for they are designed to give negative lift—in other words, they help to hold the car on the road at high speeds. On the trailing edge of these wings are aerodynamic brakes which could be useful at very high speed.

Power plant of the Firebird is the Whirlfire engine, a twin-spool gas turbine weighing 775 pounds. Energy in the combustion gases of an engine of this type is almost completely removed by the turbines, leaving little or none for jet thrust. The fuel is ordinary kerosine which is burned in two combustion chambers. Power output of the Whirlfire is 370 hp with a compressor turbine speed of 26,000 rpm and a power turbine speed of half this. This power turbine is directly connected to the car's rear wheels through a transmission. Total weight of the engine unit is 775 pounds, and the weight-to-power ratio of the engine is approximately two pounds per horsepower, or only one third that of a conventional piston engine and drive. No details of the Firebird's performance have been released, but it has been under test at the General Motor's proving ground in Michigan and at the desert proving ground in Arizona.

Interesting as these experimental cars may be, it is the stock cars that are Detroit's bread and butter. In these cars the trend that has been apparent for some years, that of increasing horsepower, has been continued in the 1954 models. Buick, for example, has increased the output of its V-8 engines in its Super and Roadmaster series. Buick has also

BARNES & BELL LTD.

79, St. GEORGE'S PLACE, GLASGOW, C.2.



Phone: CITY 7911 (5 lines)
Cables: Barbell - Glasgow
Codes A.B.C. (5th and 6th Ed.) Bentley (2nd)

ALSO AT

COATBRIDGE & BIRMINGHAM

Stockholders & Exporters of:—

NEW IRON and STEEL BARS, SECTIONS and PLATES, BOLTS, TOOLS, NAILS, etc.

•

SLEEPERS and RAILS of all kinds STEEL ARCHES and CORRUGATED STRAPS or BANK BARS for TUNNEL WORK and COLLIERY USE.

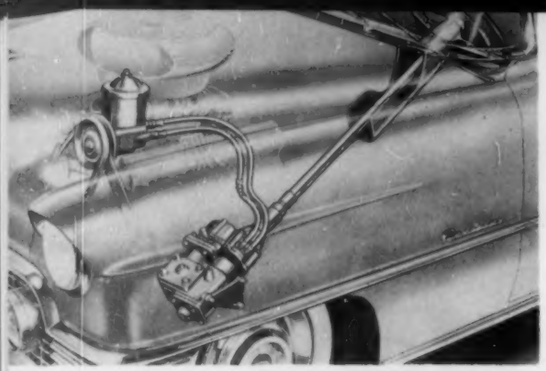
•

BUYING AGENTS

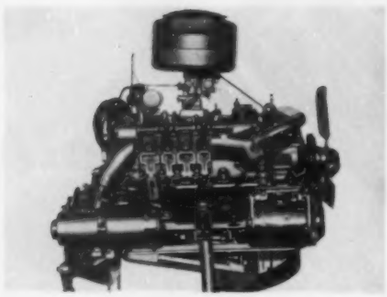
•

Mining Supplies of all Descriptions

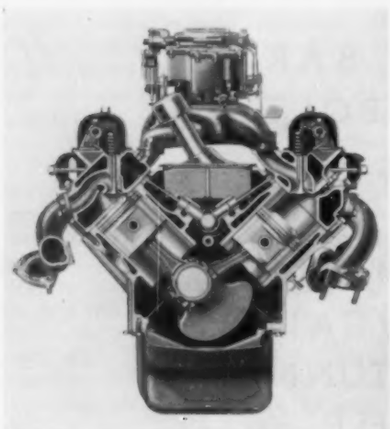
•



Standard on the 1954 Cadillac this year is the new power steering, which becomes effective when manual effort of about 3 lbs. is required on the steering wheel.



Ford's new Y-block V-8 has a 7.2:1 compression ratio and develops 130 hp. Friction is reduced to 18 percent by 3.1-inch stroke and 3.5-inch bore.



Buick's new V-8 engine for 1954 has a newly-designed combustion chamber. The piston skirt has been lengthened nearly a quarter of an inch for improved stability and longer wear. The new engine has the same upright valve arrangement and the same cam-contoured counterweights on the crankshaft as the V-8 introduced last year.

Heating system on the 1954 Cadillac uses a cowl ventilator air intake.

discontinued altogether its famous valve-in-head straight eight engines. Last year it put the V-8 on its Roadmaster and Super series and this year put a new V-8 on the Special. This new engine develops 150 hp, compared with 130 for the in-line engine it replaced, and is 68 pounds lighter. Back in the Buick line is the Buick Century, which last came off the production line in 1942. This model combines the light chassis of the Special with the 200 hp engine of the Roadmaster, and has a weight-to-horsepower ratio of 19.42, which appears to be surpassed only by the Chrysler New Yorker DeLuxe with a ratio of 17.28.

Oldsmobile, on both its V-8 engines, has upped horsepower. On the Super 88 and 98 models the jump has been from 165 to 185, and on the economy-priced 88 the increase has been from 150 to 170. Compression ratio in each case is up from 8 to 8.25 to 1. Last year at the General Motors show, Oldsmobile introduced an experimental sports car called the Starfire. This year the production model of this experimental car, the "98" Starfire, is appearing on the road. This year's experimental Oldsmobiles were the F-88 and the Cutlass, both sports cars with 250 horsepower engines.

Cadillac has added 20 more horsepower to its new models, using this year a 230 hp overhead valve V-8 engine. Pontiac introduces the Star Chief line powered by a 127 hp straight eight engine and the Chieftain with a 118 hp six cylinder engine. Chevrolet comes in the 210 and Bel Air series powered by the 125 hp Blue Flame engine and the 115 hp engine. The higher powered engine is used with Powerglide automatic transmission and is available for the first time in all models. Power steering is also available on all models, but power brakes come only on the models equipped with automatic transmission.

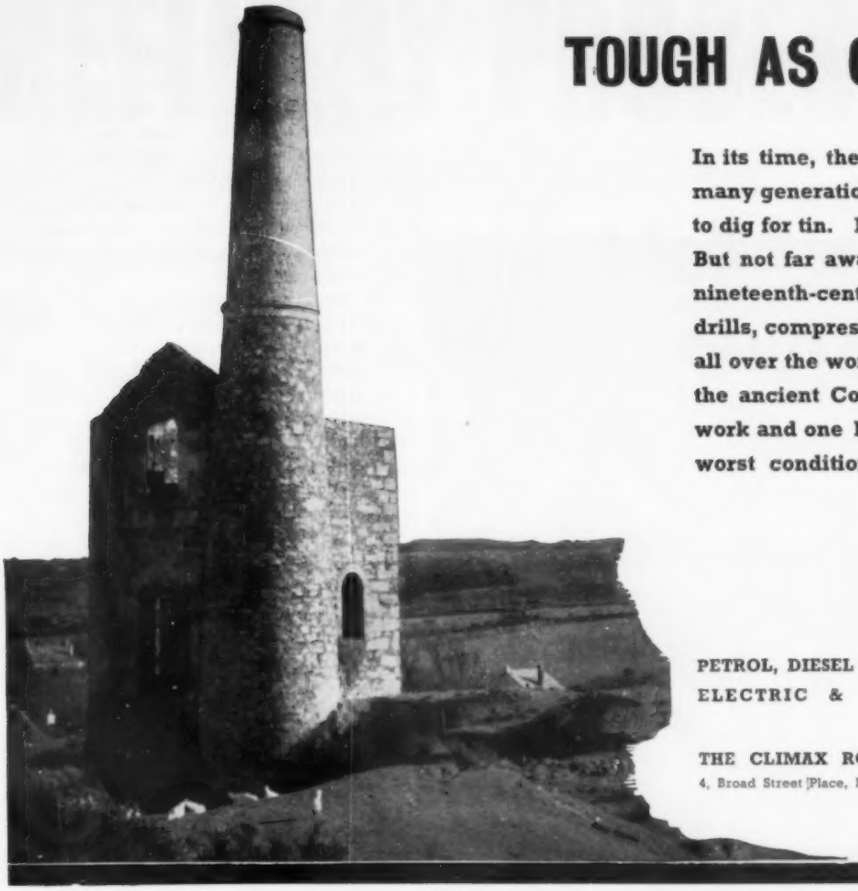
From Ford comes the news that its cars are powered by a completely new engine, a Y-block V-8 with overhead valves. Gone is the familiar L-head V-8 that in the past 20 years increased in output from 65 to 110 hp. In 1932, when this famous engine came out, it had a 5.5 to 1 compression ratio and was available in an automobile that cost all of $460. The new V-8 has a compression ratio of 7.2 to 1 and develops 130 hp at 4,200 rpm. Friction wear of the pistons is reduced to a minimum by having a stroke of 3.1 inches and a bore of 3.5 inches. In fact, according to Ford, only 18 percent of the output of the new engine is required to overcome internal friction compared with 30 percent on the previous models. Unlike most modern overhead valve engines, the Ford does not use hydraulic valve lifters. Careful design and the use of new alloys are claimed to overcome the noise inherent in a mechanical valve train. Combustion chambers in this new engine are designed to give high turbulence with the accompanying thorough mixing of the fuel-air mixture and reduction of knocking. Dual down-draft carburetors switch automatically from lean to rich when extra power is needed. Ford still has the six cylinder engine which this year develops 115 hp. Both the six and the eight are available in the Mainline, Customline and Crestline series. Common to all models is the new ball-joint front suspension that has proved so successful on the Lincoln.

Mercury, like Ford, has come out with a valve-in-head V-8 engine, the first new engine for Mercury in 15 years. Here again a boost in power is evident, the new engine developing 161 hp in comparison with the 125 hp of last year's engine. It is claimed that this new engine, which develops one horsepower for every 23 pounds of car weight (the 1953 ratio was 1 to 29), uses no more fuel than its predecessor. A four-barrel carburetor is designed to meter fuel flow to give maximum economy at all speeds. Compression ratio is 7.5 to 1.

Between 1951 and 1953 the increase in power of the average automobile engine was on the order of 20 bhp with the result that the speed went up as, of course, did fuel consumption. A study of the increase in performance of late model cars appears in *Motor Trend Magazine* for February 1954. This report shows that the average fuel consumption of cars in the lowest price field was 22 miles per gallon, while in the high price field it was 17.1. The editors feel that there will soon be an interest on the part of the public in smaller, more efficient engines that give better fuel economy for the average driver.

Perhaps the most amazing development in the automobile industry in recent years is the unpredicted public acceptance of the automatic transmission. This is an extremely convenient device, but it is an extra cost item and in general it may be said it does not contribute to the economy of operation. In spite of this, automatic drives were installed on 40 percent of the automobiles produced last year and probably even more would have been sold if it had not been for the Livonia fire which interrupted production of General Motors' Hydra-Matic units. Reviewing the 1953 models, Lincoln, Cadillac, and the Buick Roadmaster used automatic transmissions exclusively. Power steering is also catching on, and it is available on a great many more models in 1954 than in 1953. Observers feel it will be generally in use on all of the higher priced models by the end of 1954.

The increasing compression ratios have had an effect on the sale of premium fuels which are still continuing to show sales gains. These gains were particularly spectacular for those companies and particularly for Shell, who introduced TCP to reduce spark plug fouling and preignition.



TOUGH AS CORNISH GRANITE

In its time, the old engine-house at Carn Brea lowered many generations of miners deep down into the granite to dig for tin. Now it is only a picturesque ruin.
But not far away the firm that made tools for the same nineteenth-century miners is very much alive. Climax drills, compressors and pneumatic equipment now go all over the world. Tough as granite and as rugged as the ancient Cornish miners, they are famous for hard work and one hundred per cent reliability in the very worst conditions.

CLIMAX

PETROL, DIESEL AND ELECTRIC DRIVEN AIR COMPRESSORS, ELECTRIC & PNEUMATIC TOOLS AND EQUIPMENT

Agents in 38 countries

THE CLIMAX ROCK DRILL AND ENGINEERING WORKS LTD.
4, Broad Street Place, London, E.C.2. Works: Carn Brea, Redruth, Cornwall

TAS/CX.570.

OSBORN·OHIO

REFINERY FITTINGS

DIRECTIONAL SOLIDIFICATION CASTING PRINCIPLE

Directional Solidification—the design principle used with Osborn Refinery Fittings, means that the user gets better service for a longer period, through sounder metal and design.

Type 3000, screw lock fitting, is specially recommended where Stainless Steel is required for extremely corrosive service, and the short plug-seat means easy removal.

OSBORN

SAMUEL OSBORN & CO., LIMITED
CLYDE STEEL WORKS SHEFFIELD

New patents on light distillate additives

By Heinz Heinemann and Felix Heinemann

ADDITIVES and particularly gasoline additives have recently been in the spotlight of publicity. Gasolines with anti-rust properties have been widely advertised and the relative advantages of additives for preignition suppression, such as TPC, Petrox and others, have been the subject of heated discussion in scientific as well as advertising circles. Relatively few technical papers have so far appeared on these new additives and a look at the patent literature reveals that information on them is rather scarce. It is likely that much of the new development is still in the process of examination in the Patent Office and has not yet issued as patents. The current review of United States patents is intended to present such trends in technical development as have been disclosed during the period of January 1, 1953 to April 1, 1954.

Additives for Better Engine Performance

Indium laurate has been proposed as a gasoline additive which lowers the exhaust temperature of an internal combustion engine by about 40° F. In patent 2,628,895 (W. S. Murray and J. R. Dyer, Jr. to the Indium Corp. of America), indium laurate is used in amounts of about 0.12g/gal. of gasoline. About 8 percent more available energy is released than in the absence of the additive and the engine oil temperature is lowered.

Improved anti-knock rating under both lean and rich mixture conditions and increased sensitivity is claimed in Phillips Petroleum Company patent 2,653,862 (H. M. Trimble, L. A. Reynolds and B. Mitacek) for a fuel containing mono-isopropyl-amine. The proposed fuel consists of 80-99 percent gasoline, 1-7cc/gal of tetraethyl lead and 1-20 percent mono-isopropyl-amine. The additive lowers the boiling point slightly and increases the percent evaporated at 212° F from 31 percent in the absence to 36 percent evaporated in the presence of 5 percent additive and 39.8 percent evaporated with 10 percent additive. Octane numbers (F-1 clear) increase from 62.6 to 68 and 74.2 for 5 percent and 10 percent additive addition. In the presence of 2.9cc TEL in the gasoline, the F-1 octane number increase is from 78.4 (no additive) to 82.5 (5 percent additive) and 86.4 (10 percent additive). Fuel containing mono-isopropyl-amine has much higher C-1 and C-3 ratings than the base stock.

Valve sticking and excessive hard gum formation in engines is avoided, according to H. S. Anders and F. L. Nelson (2,654,697 to Socony-Vacuum Oil Co.), by incorporating into gasolines 0.15-0.25 vol. percent of a petrolatum stock which is insoluble in kauri-butanol solution at 75-80° F. The additive has an API gravity of 30-35°, a flash point of about 440° F, a melting point of 115-135° F and a Saybolt viscosity at 210° F of 95-125 sec.

An additive which dissolves and fluxes gummy deposits and gives increased solvency powers is described by J. E. Neudeck (2,646,348 to Standard Oil Dev. Co.). It consists of 70-81 percent of dimethyl-carbinol and a 30-19 vol. percent of a liquid hydrocarbon mixture, having a kauri-butanol solvent power above about 20, a 50 percent point above 350° F, a Saybolt viscosity at 100° F of below 450 sec. and an API gravity of 18-28°. The additive may contain 0.5-2.5 percent of sorbitan mono-oleate as a rust preventative.

Corrosion and Rust Inhibitors

F. M. Watkins (2,632,694 to Sinclair Refining Co.) proposes to incorporate anti-corrosive properties into light distillate fractions by addition in synergistic proportions in the range of 0.2-2.5 lbs. per 1000 bbl. of fuel of ammonium mahogany sulfonates and 0.05-5 lbs./1000 bbl. of a higher oil soluble carboxylic acid corrosion inhibitor. Acyloxy carboxylic acids having at least 10 C atoms/mole are suitable.

A corrosion inhibitor comprising a salicylic acid salt of a glyoxalidine of special composition is described in 2,668,100 (G. W. Luvisi, National Aluminate Corp.).

Mineral oil containing 0.001-2 percent lead naphthenate and 0.01-5 wt. percent pentaerythrol mono-oleate is claimed as a rust inhibitor in patent 2,634,237 (W. J. Kopf and L. C. Wescott to Shell Dev. Co.). Standard Oil Development Company patent 2,637,703 (T. W. Dixon and L. W. Sproule) discloses an aromatic-free mineral oil containing dissolved therein 15-30 wt. percent sodium petroleum sulfonate, 0.75-1.5 wt. percent ethylene glycol monobutyl ether and 2-4 wt. percent pentaerythrol mono-oleate, while P. S. Landis and E. B. Backensto (2,632,695 to Socony-Vacuum Oil Co.) prevent rusting of ferrous metal surfaces in contact with a light petroleum fraction by dissolving in it an agent of (1) dimeric acids produced by condensation from monocarboxylic acids with 16-18 C atoms/mole, (2) dimeric acids from similar hydroxyaliphatic monocarboxylic acids and (3) corresponding trimeric acids.

Antioxidant Additives

A group of patents issued to Ethyl Corporation utilizes amino and sulfur compounds to prevent oxidative deterioration of gasolines. According to 2,657,983 (E. F. Hill and M. L. Osip) stabilization is obtained by the addition of 0.1-15 mg./100cc of gasoline of a composition comprising 30-100 parts by weight of alkyl thioglycolate and about 100 parts of an aminophenol. Stabilization of both hydrocarbons and tetraethyl lead in gasoline may be obtained by addition of a synergistic antioxidant (2,657,982, E. F. Hill and M. L. Welp). This additive consists of a lower alkyl-p-phenylene diamine and a sulfur compound selected from alkyl mercaptans containing from 4-12 C atoms/mole, furfuryl mercaptan and the lower alkyl esters of thioglycolic acid. The sulfur compound is present in an amount of 25-50 wt. percent of the synergistic antioxidant. Stabilization of gasoline against oxidative deterioration is obtained by addition of a (cyclohexylamino) diphenylamine wherein the number of alkyl substituents of each cyclohexyl radical varies from 1-2 (2,635,042, E. F. Hill). Concentrations of 3-6 mg/100cc. cause marked increase in induction periods.

A combination of an aminophenol and a quaternary ammonium oxide is proposed as an antioxidant additive for motor fuels in 2,633,415 (J. A. Chernicek to Universal Oil Products Co.). Mixtures of 0.001-0.1 wt. percent of N-n-butyl-p-aminophenol and 0.0001-0.1 percent of a quaternary ammonium alkoxide such as benzyl trimethylammoniumbutoxide may be employed.

J. G. Browder (2,638,412 to Standard Oil Dev. Co.) describes an inhibitor for the distillation of aviation gasoline containing olefins susceptible to gum formation during distillation. Monohydroxy phenols such as 2,4,6 tri-tert. butyl phenol or 2,4-dimethyl-6-tert. amyl-4-methyl phenol are added to the still feed in amounts of 0.01-0.5 lbs./1000 gal. A reduction in the accelerated gum test from 26.4 to 1.4 mg. is claimed.

REFINERY PROCESS NEWS

PUBLISHED BY REFINERY PROCESS DIVISION, THE M. W. KELLOGG COMPANY JUNE-JULY 1954

Patented Plug Valve Key to Orthoflow's Easy Operation

Unique mechanical features of Orthoflow Fluid catalytic crackers (of both the Model "A" and Model "B" design) are the plug valves which replace the more conventional slide valves. Designed and patented by Kellogg, they might well be termed the key to the decreased investment, easy operation and low maintenance cost of Orthoflow units.

Not only do the valves make feasible the elimination of expansion joints but they are also much more easily maintained than slide valves. Actually, the new valves make possible the basic advantage of the Orthoflow: Straight-line flow of catalyst with its concomitant reduction of the erosion problem.

The plug valves have proved so successful that it is seldom necessary to remove them. However, they are so arranged that they can be unflanged, lowered from the bottom head of the vessel, and taken to the shop for maintenance, if and when required, while the

rest of the unit is being inspected.

Although the plug of the valve is subjected to the same erosive material encountered in slide valves, Orthoflows in operation for as long as three years have proved remarkably free of erosion difficulties. The rate of erosion of the plugs is considerably less than in slide valves, and unlike slide valves where erosion results in loss of control over catalyst flow, plugs can erode without appreciably affecting operability. The plugs themselves are bolted in for easy replacement when required.

First Model "B" Orthoflow Proves Success of Design; Second on Stream

Having passed an intensive series of operational tests with flying colors—with design guarantees exceeded in every category—Kellogg's first Model "B" Orthoflow Fluid catalytic cracker has dramatically demonstrated the success of the new design. At the same time, a second Orthoflow of this type (shown in the illustration above) recently went on stream for the same refiner at another location.

As an example of actual test results obtained, the first Orthoflow unit has bettered its designed production capacity of 44 vol. % of debutanized gasoline. Since this test run, the gasoline yield on a somewhat better feed has exceeded 48%. The gasoline product has consistently rated higher than the design guarantee of 90 octane (CFR-R clear). At the same time, production of dry gas and butanes has been held to considerably less than the maximum allowances. Coke burning capacity has averaged almost 1500 pounds per hour more than the designed minimum, and catalyst loss has averaged 1.22 tons per day—considerably less than the guaranteed maximum.

One of two versions of Kellogg's exclusive Orthoflow design, the Model "B" differs from its predecessor, the Model "A", principally in the placement of the reactor and regenerator. Both feature straight-line catalyst flow and single-vessel construction, but in the Model "A" the reactor is above the regenerator and in the Model "B", the placement is reversed.

Process-wise, in addition to allowing a decrease in the size of the reactor, one result of placing the regenerator on top is that the latter can be operated at a lower pressure, effecting savings in direct operating costs since horsepower requirements for compressing regeneration air are reduced.

Thus, in the Model "A", pressure of about 18 pounds is required in the regenerator and about 10 pounds in the reactor in order to maintain optimum circulation of catalyst between the two zones. In the newer "B" design, reactor pressure is held at about 15 pounds while the regenerator operates at around seven pounds, retaining the same eight-pound differential but transferring the air compressor requirements to the lower pressure side of the operation.

SEE REVERSE SIDE

REFINERY PROCESS NEWS

CONTINUED FROM PRECEDING PAGE

Straight-Line Flow in Orthoflow Design Eliminates Erosion

While the Model "B" Orthoflow design is as yet too recent for the complete evaluation of long range operating characteristics such as erosion and maintenance requirements, experience with units of the earlier Model "A" design offers convincing evidence of what can be expected in the new design.

One of the principal features which sets both Orthoflow models apart from other Fluid catalytic crackers is straight-line flow of catalyst, made possible by single-vessel arrangement of reactor and regenerator. By eliminating curved external catalyst lines, decided reduction in erosion from the sand-blasting action of the catalyst has resulted. In contrast to side-by-side units where bends in the catalyst lines have actually worn through, Orthoflow units have been in operation for as long as three years with only negligible erosion in all lines including the high velocity riser.

Also related to straight-line flow is the ease of operation of Orthoflow units. Catalyst flow has actually been started up after shutdowns simply by turning on the air supply; stopping the units, or securing and maintaining catalyst flow after interruptions, have been equally easy. Since they are straight, the lines are self-draining on shutdown. Consequently the catalyst does not pack in the lines nor do the lines require a lengthy, inconvenient emptying out process before start-up as do older units.

Straight-line catalyst flow is also responsible for much of the lower initial cost of Orthoflow units. Aside from obvious savings in structural materials gained by combining reactor and regenerator, considerable additional savings result from the fact that no costly provisions for mechanical expansion joints are required. While pipes in the Orthoflow units operate at high temperatures just as in conventional units, expansion is far easier and less costly to compensate.

For further information, technical data, etc., on any refining process, write

REFINERY PROCESS DIVISION
THE M. W. KELLOGG COMPANY
225 Broadway, New York 7, N. Y.
Also Jersey City, Los Angeles, Tulsa, Houston, Toronto, London and Paris

KELLOGG PULLMAN

World's Largest Orthoflow . . .

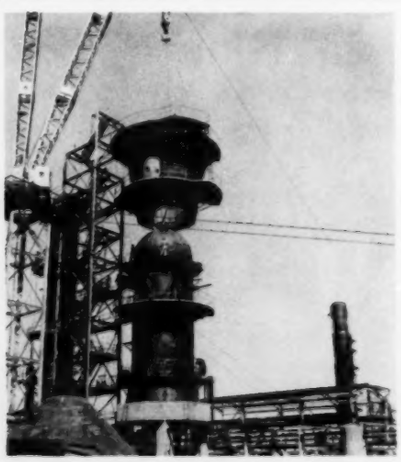
Shown above as it neared completion at the Atlantic Refining Company's Point Breeze refinery in Philadelphia is the largest Orthoflow Fluid catalytic cracking plant to be designed and built to date. This new unit is expected to go on stream early this summer.

Like other units described in this issue of "Refinery Process News," this Orthoflow is of Kellogg's Model "B" design. While other crackers of comparable or larger size have been built, they have all been designed with separate side-by-side vessels, one for the cracking reaction and the other for regeneration of catalyst.

The new Orthoflow for Atlantic has a reactor throughout of 45,000 barrels per day. It is one of a total of thirteen Orthoflows (including both "A" and "B" models) completed or underway since Kellogg first introduced the unique process design in 1951.

The first Orthoflow was erected as part of a combination refinery in Canada. This plant was followed in rapid succession by other larger units distributed in many parts of the world from Texas to Germany and Jugoslavia.

AUSTRALIA GETS AN ORTHOFLOW



Shown at the left is a recent view of the catalytic cracking area of a new 70,000 BPD refinery currently under construction in Western Australia by Kellogg International Corporation. The cracker is a Model "B" Orthoflow with a design capacity of 12,500 BPD.

As this photo was taken, the skirt assembly was being hoisted into place atop the reactor. Above the skirt will go the regenerator vessel, the head for which is shown in the foreground.

Four other Model "B" Orthoflow units are underway in the U. S. and Canada at the present.

Lahee report shows 13,313 exploratory wells drilled in U. S. in 1953

THE ANNUAL REPORTS prepared by Dr. F. H. Lahee of Sun Oil Company as chairman of the committee on exploratory drilling of The American Association of Petroleum Geologists are recognized as the authoritative statement of progress in the United States in the search for new sources of oil supply. For 17 years Dr. Lahee, with the assistance of leading geologists in different parts of the country, has painstakingly collected statistics of exploratory wells drilled, with their location and a careful classification as to producers of oil or gas, dry holes, outposts and new pools, and details as to the basis on which the drilling was done, whether as a result of geological or geophysical surveys or not.

The ninth such report prepared as a committee activity of the AAPG details exploratory activities during 1953. A condensation, with tables of essential statistics, is presented herewith.*

In the states covered in this review, as shown in Table I, a total of 60,702,371 feet was drilled in 13,313 exploratory holes during 1953 divided as follows:

2,680 producers ..... 13,422,578 ft.
10,633 dry holes ..... 47,279,793 ft.

This means that 20.13 percent of the holes drilled, and 22.11 percent of the footage drilled, were successful in 1953. One producer foot was drilled for every 3.52 feet of dry hole. One successful well was drilled for every 3.98 dry holes. The average depth of hole was 4,560 feet.

Attention is called to the average depth figures for the various producing classes and for dry holes, and totals, at the bottom of the footage columns in Table I.

According to the best information available, 689 new-field wildcats drilled on technical advice (geology and geophysics) were successful and 5,058 were dry; 21 holes located for non-technical reasons were producers, and 426 were dry; 64 producers and 667 dry holes were located for reasons unknown. These figures show that 11.9 percent of the new-field wildcats drilled on tech-

* The full report will appear in the June issue of the Association's Bulletin.

TABLE I

Number of wells drilled in United States as exploratory tests in 1953.

States	Oil Producers		Gas Producers		Condensate Producers		Total Producers		Dry Holes		Grand Totals		Average Depth of Hole*
	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	
Alabama	0	0	0	0	0	0	0	0	79	409,188	79	409,188	5,180
Arizona	0	0	0	0	0	0	0	0	6	20,315	6	20,315	
Arkansas	18	100,681	1	586	0	0	19	101,267	101	405,480	120	506,747	4,223
California	79	421,679	19	76,075	0	0	98	497,754	517	2,319,394	615	2,817,148	4,581
Colorado	36	201,533	15	73,317	0	0	51	274,850	323	1,717,040	374	1,991,890	5,326
Florida	0	0	0	0	0	0	0	0	34	213,585	34	213,585	6,282
Georgia	0	0	0	0	0	0	0	0	10	24,504	10	24,504	
Idaho	0	0	0	0	0	0	0	0	5	17,070	5	17,070	
Illinois	67	182,274	2	686	0	0	69	182,960	502	1,087,357	571	1,270,317	2,225
Indiana	57	86,624	4	3,552	0	0	61	90,176	448	730,344	509	820,520	1,612
Iowa	0	0	0	0	0	0	0	0	1	443	1	443	
Kansas	296	1,011,023	48	208,759	0	0	344	1,219,782	1,285	4,716,127	1,629	5,935,909	3,644
Kentucky	68	119,941	12	34,321	0	0	80	154,262	320	616,457	400	770,719	1,927
Louisiana	98	911,913	15	158,014	38	446,555	151	1,516,482	476	4,107,608	627	5,624,090	8,970
Maryland	0	0	1	7,238	0	0	1	7,238	0	0	1	7,238	
Michigan	20	52,729	6	14,816	0	0	26	67,545	257	638,396	283	705,941	2,494
Mississippi	13	87,862	2	8,862	4	32,925	19	129,649	176	1,240,280	195	1,369,929	7,025
Missouri	0	0	0	0	0	0	0	0	2	4,050	2	4,050	
Montana	14	91,231	1	3,263	0	0	15	94,494	148	755,390	163	849,884	5,214
Nebraska	24	108,327	9	42,992	0	0	33	151,319	130	625,680	163	776,999	4,767
Nevada	0	0	0	0	0	0	0	0	8	12,015	8	12,015	
New Mexico	34	273,426	18	79,136	4	26,990	56	379,552	139	814,198	195	1,193,750	6,122
New York	0	0	1	1,855	0	0	1	1,855	22	42,501	23	44,356	
North Carolina	0	0	0	0	0	0	0	0	2	7,801	2	7,801	
North Dakota	28	211,020	0	0	0	0	28	211,020	78	394,887	106	605,907	5,716
Ohio	5	11,800	21	53,201	0	0	26	65,001	67	197,366	93	262,367	2,821
Oklahoma	177	811,183	44	202,068	7	36,742	228	1,049,993	736	3,045,422	964	4,095,415	4,248
Oregon	0	0	0	0	0	0	0	0	1	1,894	1	1,894	
Pennsylvania	0	0	24	178,766	0	0	24	178,766	33	207,984	57	386,750	6,785
South Dakota	0	0	0	0	0	0	0	0	18	90,988	18	90,988	
Tennessee	8	8,080	1	595	0	0	9	8,675	21	25,551	30	34,226	1,141
Texas	883	4,416,440	176	981,286	130	1,008,697	1,189	6,406,423	4,404	21,422,923	5,593	27,829,346	4,976
Utah	8	57,257	8	39,771	0	0	16	97,028	43	239,220	59	336,248	5,699
Virginia	0	0	6	43,953	0	0	6	43,953	9	41,679	15	85,632	
Washington	0	0	0	0	0	0	0	0	2	6,111	2	6,111	
West Virginia	2	3,351	77	211,173	0	0	79	214,524	21	50,999	100	265,523	2,655
Wyoming	46	263,326	5	14,684	0	0	51	278,010	209	1,029,546	260	1,307,556	5,029
Total U. S.	1,981	9,431,700	517	2,438,969	182	1,551,909	2,680	13,422,578	10,633	47,279,793	13,313	60,702,371	4,560
Average depth per hole		4,761		4,718		8,527		5,008		4,447		4,560	

* Average per-well footage given only when 25 or more wells were drilled in a state.

TABLE II

Relative success of exploratory drilling, 1944-53.

Year	*New-Field Wildcats*		*All Exploratory Holes*	
	Number of Dry Holes for Each Producer	Percentage of Wells Successful	Number of Dry Holes for Each Producer	Percentage of Wells Successful
1944	8.05	11.05	4.08	19.67
1945	7.63	11.59	3.62	21.64
1946	8.39	10.65	4.06	19.76
1947	7.80	11.32	3.90	20.34
1948	7.57	11.66	4.50	18.25
1949	7.79	11.37	3.95	20.20
1950	7.93	11.19	4.11	19.54
1951	8.05	11.05	4.30	18.86
1952	8.05	11.06	4.32	18.78
1953	7.95	11.18	3.98	20.13
1944-1953, inclusive	7.74	11.44	4.10	19.60

TABLE III

New-pool discoveries* and extensions of older pools.

	New Pools Discovered in 1953					*Extensions of Old Pools in 1953*				
	By Outposts	By New-Pool Wildcats	By Deeper-Pool Tests	By Shallower-Pool Tests	Total New Pools Discovered in 1953	By Outposts	By New-Pool Wildcats	By Deeper-Pool Tests	By Shallower-Pool Tests	Total Extensions in 1953
Oil	137	357	113	81	688	538	162	11	1	712
Gas	43	59	19	24	145	202	33	2	4	241
Condensate	13	26	13	4	56	49	14	1	0	64
Totals	193	441	145	109	889	789	209	14	5	1,017

* This table does not include discoveries of new fields.

TABLE IV

Fields* discovered in 1947, 1950, and 1953, grouped according to their total ultimate reserves as estimated on January 1, 1954.

Year of Discovery	*Reserves Groups***						Total A—F Inclusive	A+B+C Fields	Percentage of A+B+C Fields in Total Fields
	A	B	C	D	E	F			
	Number of Fields Discovered in Year Indicated								
1947	4	7	15	52	165	58	301	26	8.64
1950	3	10	17	98	280	58	466	30	6.44
1953	0	4	13	74	505	7	586	17	2.90

* This table refers only to 17 principal oil producing states. It does not include gas fields unless natural gas liquids are produced, and then the reserves figure relates only to these liquids. A few fields were omitted because of inadequate estimates, and a few producing areas, at first thought to be new fields, have become consolidated with other fields.

** In this table, A means 50 million barrels or more.
B means between 25 and 50 million barrels.
C means between 10 and 25 million barrels.
D means between 1 and 10 million barrels.
E means less than 1 million barrels.
F means abandoned.

nical advice were producers as contrasted to 4.7 percent successful in the case of holes located without technical advice. Therefore, in 1953, locations for new-field wildcats based on technical recommendations were 2.5 times as successful as those drilled without such advice. Seismographic methods were largely responsible for 340 producers and 1,745 dry holes among the new-field wildcats.

As shown by the statistical matter in Table I, the greatest amount of exploration during the year, both in wells drilled and footage, was in Texas, with 5,593 wells and 27.8 million feet drilled. Following, in descending order, were: Kansas, Louisiana, California, Colorado, Wyoming, New Mexico and Montana. The mountain states were among the most active exploratory areas, with 1,002 wells and a footage of 5.34 million.

Table II provides a comparison of the relative success of wildcatting over the past decade. The statistics are interesting as showing the constancy in the ratio of successful wells to holes drilled. In this respect the record of 1953 was slightly above the average and shows that modern techniques of oil finding are maintaining a satisfactory degree of efficiency. The division of discoveries between new pools and extensions is indicated in Table III, while Table IV classifies discoveries, in 17 states, of fields at three year intervals according to their estimated reserves. The significance of this tabulation lies in the much smaller proportion of large fields brought in during 1953 than in the earlier years, none being estimated to contain over 50 million barrels and 85 percent containing less than a million barrels. This confirms the general consensus that big fields are becoming more difficult to find.

Included in Dr. Lahee's report are statistics of exploration in Canada compiled by a group of Canadian geologists headed by A. W. Nauss, and Mexican figures supplied by Pemex.

In Western Canada 898 exploratory holes were completed, 259 of these being producers and 639 being dry holes. The producers included 141 oil wells and 118 gas wells. A total of 3,756,463 feet was drilled, 1,084,069 in producers and 2,672,394 feet in dry holes. This means that 28.8 percent of the exploratory footage was successful. There were 2.46 feet drilled in dry holes for every foot drilled in producers. The average depth of exploratory holes was 4,183 feet.

Among the 615 new-field wildcats completed in Western Canada in 1953, 96 were successful and 519 were dry, a success ratio of 15.3 percent.

In Eastern Canada, 91 exploratory holes were drilled, with a total of 153,401 feet. Eight were successful, four as gas and four as oil wells, all in southwestern Ontario. For every foot drilled in producers, 18.9 feet were drilled in dry holes. The average depth of hole was 1,685.7 feet.

Data on exploratory drilling in 1953 in Mexico show 128 exploratory holes were drilled, with a total of 515,462 feet. Of these holes, 59 (49 oil wells and 10 gas wells) were successful. For each producer-foot, 1.11 feet were drilled in dry holes. The average depth of all 128 holes was 4,027 feet.

Forty-seven of the 128 holes were new-field wildcats, and 13 of these, or 27.6 percent, were successful. All were drilled on a technical basis.

FOR OIL REFINERY & CHEMICAL PLANTS

Special Two-hole Reducing Terminal with Flanged Side Outlet.

MILLENNIUM KEY

Millennium—Key Cast Steel Fittings

FOR STRENGTH & PRESSURE TIGHTNESS

These four bulletins give full technical information on each type of fitting we can supply. Please write for them

Lake & Elliot Ltd.
BRAINTREE ENGLAND

L460BD

Equipping for comfort and full-time efficiency

Economically and far-sightedly the great Companies with installations throughout the world have equipped with Dunlopillo — the modern cushioning that means more comfort and better work where people are employed in trying climates. For office, transport and canteen seating, in seating and mattresses for staff quarters, Dunlopillo is a long-term investment. Its air-conditioned latex foam withstands constant use without loss of resilience, without sagging, or "breaking down", and it is unaffected by extreme temperatures or humidity throughout its long life of undiminished comfort.

with

DUNLOPILLO

and all its advantages— *not affected by temperature or humidity • moth, germ and vermin-resisting • cannot create dust or fluff • never needs airing • cannot sag or form lumps • never needs re-making • silent in use*

DUNLOP RUBBER CO. LTD., (DUNLOPILLO DIVISION), WALTON, LIVERPOOL, ENGLAND · ASSOCIATED COMPANIES AND DISTRIBUTORS THROUGHOUT THE WORLD
40/05

INTERNATIONAL NEWS AND NOTES

British Consumption Up 8.5 Percent

Consumption of oil in the United Kingdom, exclusive of bunkers for ships engaged in foreign trade, totaled 19,002,695 tons during 1953, compared with 17,510,285 tons in 1952.

Demand for motor spirit amounted to 5,739,955 tons as against 5,440,552 tons in 1952. This demand was divided between premium grade spirits (consumption 2,452,632 tons) and standard grades (3,287,323 tons). Last year, as a consequence of the erection of catalytic cracking plants in Britain at a cost of over £20 million, premium grade spirits were on sale in this country for the first time since the war, when, states the Petroleum Information Bureau, the proportion of premium spirit used was somewhat less than at the present time. One interesting feature is that although the bulk of premium grade spirits are taken by dealers for supply to private motorists, commercial consumers last year took 255,378 tons of premium grade compared with 1.709.063 tons of standard grade. Dealers took 2 197,254 tons of premium and 1,578,260 tons of standard.

Other items showing a major increase included gas/diesel and fuel oil which accounted for 5,532,465 tons against 5,098,194 tons in 1952. The mounting consumption of these products reflects increasing industrial activity. The only product of which consumption declined in 1953 was kerosine, reflecting in part the growing use of diesel engined tractors.

Anglo-Iranian Reports Earnings

Anglo-Iranian Oil Co., Ltd., in a preliminary report for the year ended December 31, 1953, announced consolidated profit before taxes amounted to £43,827,585 ($122,717,238), compared with £47,061,638 ($131,772,586) in the preceding year. Consolidated net profit for 1953 was £23,589,434 ($66,050,415) after taxes of £19,342,232 ($54,158,249). This compares with net income of £24,395,294 ($68,306,823) after U. K. taxes of £22,666,344 ($63,465,763) in 1952.

Directors recommended that the final dividend on the ordinary stock be kept at 70 cents per share, but that the cash bonus be raised from 14 cents to 35 cents. This, with a previous interim dividend of 14 cents paid November 27, 1953, brings the total for the year to $1.19, less income tax. This compares with 98 cents declared in 1952.

U.S. Gas for Canada

An agreement between Union Gas Co. of Ontario and Panhandle Eastern Pipe Line Co. provides for the importation to Canada of 15½ billion cubic feet of natural gas annually. This is in addition to 5½ billion cubic feet now being delivered yearly. The gas is intended for distribution in southwestern Ontario.

Conclusion of the agreement is dependent on approval by the Federal Power Commission of the United States. The contract as drawn is for a period of 20 years, but is subject to cancellation by Union whenever the supply of gas from Western Canada by a pipe line now authorized is sufficient to supply the Ontario market.

New Lane-Wells Station in Venezuela

Opening of a new station at Barinas, Venezuela, in the Apure Basin, by Petro-Tech Service Co., a Lane-Wells affiliate, has been announced by Rodney S. Durkee, president. James O. Landrum, formerly assistant district superintendent at El Tigre, is district superintendent of the new base.

With headquarters in Caracas, Petro-Tech also has branches at Maracaibo, Anaco, Las Morochas, Quiriquire, El Tigre, Jusepin and Las Mercedes.

Middle East Oil Production

The following crude oil production figures for the month of March 1954 are announced:

	MARCH 1954 (LONG TONS)	CUMULATIVE 1954 (LONG TONS)
Iraq Petroleum Co. (Kirkuk field)	1,916,766	5,649,501
Basrah Petroleum Co. (Zubair field)	355,732	937,927
Mosul Petroleum Co. (Ain Zalah & Butmah fields	114,275	318,078
Qatar Petroleum Co.	392,522	1,121,842
Kuwait Oil Co.	4,240,208	10,665,861
Aramco (30,325,742 bbls.)	4,098,075	11,573,767
Total for 1st quarter of year		30,266,976

To Expand West Australian Drilling

A report from Sydney, Australia, quotes W. G. Walkley, managing director of Ampol, which is a partner of Caltex in developing the large concession in West Australia on which oil was discovered, as saying that the arrival of heavy drilling equipment from the United States will permit the drilling of ten new wells in the Exmouth Gulf area during the current year. According to this report, it is expected that this enlarged exploration and development activity will require the investment of six million dollars in addition to the four and a half million already expended.

Trans-Canada Appointment

James C. Saks has been appointed assistant to president N. E. Tanner of Trans-Canada Pipe Lines Ltd. Mr. Saks formerly was associated in Vancouver with Trans-Continental Resources Ltd. and Stevenson and Kellog Ltd., management consultants, and was general manager of Atkins and Durbrow Ltd.

After five and a half years overseas in the Royal Canadian Navy, he retired with the rank of lieutenant-commander. He resumed law practice in Edmonton and then went to the Harvard Graduate School of Business Administration and attended post-graduate courses at Harvard Law School. For the past 12 months he has been publisher of the *Western Oil Examiner* in Calgary.

J. C. Saks

Suez Canal Earnings Rise

The Board of Directors of Suez Canal Co. have announced approval of a $5,714,285 program for further widening and deepening the 104-mile long waterway. The action follows a decision to reduce Suez Canal transit tolls for the 27th time on July 15th.

The contemplated five and three-quarter million dollar improvement program is in addition to routine dredging and maintenance expenditure which, in recent years, has averaged well over ten million dollars annually.

Receipts of the canal company in 1953 were 30,853,530,514 Frs. ($88,152,944) as against 28,379,481,562 Frs. ($81,084,233) in 1952.

Expenditures were 15,406,437,262 Frs. ($44,018,393) compared with last year's 14,728,384,334 Frs. ($42,081,098), leaving a surplus of income over expenditures of 15,447,093,252 Frs. $44,134,552).

To this surplus is added 91,500,805 Frs. ($261,430) brought forward from the previous account, bringing the total available profit to 15,538,594,057 Frs. ($44,395,983) as against 13,732,345,875 Frs. ($39,235,273) for 1952.

As of July 15 next, tolls for laden vessels will will be decreased from 36.5 Egyptian Piastres ($1.048) per Suez Canal net ton to 34 E.P. ($0.975) and the rate for ships in ballast from 17 E.P. ($0.488) per ton, to 15.5 E.P. ($0.444). It is pointed out that the reduction will be of particular advantage to tanker operators for it is proportionately larger in the case of ballast vessels than in the case of loaded ships. This is in consideration of the fact that a large proportion of the traffic through the Canal consists of tankers which, in the majority of cases, have to make an unproductive ballast journey before returning with their cargo.

Oil Find in Cuba

A report from Cuba early in May announced an oil find that showed evidence of major importance in the central part of the island. The find was reported by a Cuban company, Grupo Jarahueca-Motembo, which said the discovery well was brought in about four miles from Jatibonico in Camaguey province, some 230 miles southeast of Havana.

The well was reported flowing at the rate of 200 barrels a day after the original production of 250 barrels daily had been choked back for better handling. United States interests are reported to have a substantial interest in the company making the discovery.

Products Line Completed in France

Completion of the petroleum products pipe line between Le Havre and Paris was announced early in May. The line is 138 miles long, of 10-inch diameter, and has a capacity of 22,500 barrels daily, which can be gradually increased to 40,000 barrels per day.

The line was built by Soc. des Transports Petroliere, a joint company organized by leading oil companies, the Treasury and the Port of LeHavre.

British Oil Exports Grow

United Kingdom exports of refined petroleum products for the first quarter of 1954 earned just over £21,500,000 ($60.7 million). This compares with slightly less than £19,300,000 ($54 million) for the first quarter of 1953, and an average of nearly £18,000,000 ($50.4 million) per quarter for the whole of last year. Thus the earnings for the first quarter of this year were the highest in any such period to date.

Turkish Permit to Amoseas

A geological exploration permit has been granted to American Overseas Petroleum Ltd. (Amoseas), Caltex affiliate, by the Turkish government. In anticipation of the passage of the petroleum law authorizing foreign producers to develop petroleum resources, Amoseas has had geologists in Turkey since 1953.

RICHARDS

SPECIAL PURPOSE

Nuts, Bolts and all-thread Studs from special creep-resisting alloy steel, supplied in fully heat-treated condition within the 55-65 ton tensile range.

Studs are B.S.970/1947 EN19A (comparable to American ASTM 193-4 (t) Class B7 and B.S.S.1750-1951.

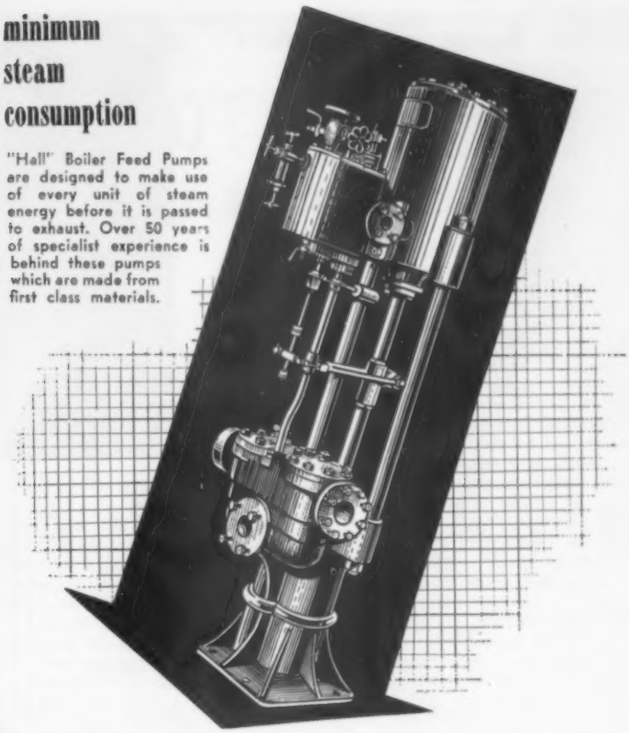
Nuts are Hot Forged and can be supplied to full Whitworth or American Heavy Standard sizes and heat-treated to ASTM 194-46 Class 2 or 2H and B.S.S.1750-1951.

Studs and nuts screwed to Unified, American, British Standard Whitworth Thread and British Standard Fine Thread, according to customers requirements.

CHARLES RICHARDS & SONS LTD., DARLASTON, near WEDNESBURY.

minimum steam consumption

"Hall" Boiler Feed Pumps are designed to make use of every unit of steam energy before it is passed to exhaust. Over 50 years of specialist experience is behind these pumps which are made from first class materials.



HALL BOILER FEED PUMPS

Of the Vertical Single Cylinder Direct and Double Acting type, the standard range of Hall Pumps covers capacities from 250 to 10,000 gallons per hour.

J. P. HALL & SONS LTD PETERBOROUGH ENGLAND

P3834

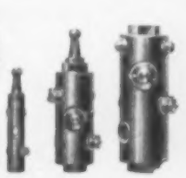
Descale WITHOUT Danger

The Air Motor "Skatoskalo" Set enables the operators to descale and clean tubes in the shortest possible time with the greatest efficiency. The air motor gives more horse-power and does not stall when heavy deposit is encountered.

The Air Motor Driven Set incorporates all the advantages of a Rotary Air Tool without sacrificing the advantages of the electrically-driven Flexible Drive type.

"Skatoskalo" equipment can be used with complete safety and is recommended for the efficient maintenance of cracking plant, boilers, evaporators, condensers, heat exchangers, etc.

Tubes of 5/8" internal dia. upwards can be thoroughly cleaned by "Skatoskalo" Air Tools.



Skatoskalo pneumatic tools deliver 9,000 blows a minute. Other types for surface scaling.

The **"SKATOSKALO"** Single Speed Air-Driven Descaling Machine

Flexible Drives (Gilmans) **LTD.**

INCORPORATING F. GILMAN (B.S.T.) LTD.

A Type T.E. tube scaling head "bites" into scale at 5 different levels as it progresses through a 2" tube.

Use **SKATOSKALO**

Write for Catalogue WP or contact our nearest Agent.

Representatives in all parts of the United Kingdom. Principal agents in over sixty countries throughout the world.

195 HIGH STREET, SMETHWICK 41, STAFFORDSHIRE, ENGLAND

Cables: **Skatoskalo, Birmingham**
Code: **Bentleys**

Niarchos, Builder of Supertankers

By constructing in rapid succession during the past few years a fleet of tankers far outranking in size and capacity anything previously attempted, Stavros Spiros Niarchos has made himself an outstanding figure in the oil transportation field. His latest vessel, the "World Glory," built by the shipbuilding division of Bethlehem Steel Co. at Quincy, Mass., with a deadweight of 45,130 tons, is at present the largest cargo carrying vessel afloat, having completed her trial runs only in May. She may not, however, represent the culmination of the Niarchos ambition, as he has two other oil carriers on order of the 45,000-ton or over class for delivery in 1955 and 1956.

Stavros Niarchos was born in Athens in 1909 of a family of Spartan origin. His parents were naturalized citizens of the United States who had returned to Greece after a residence of several years in America. Educated for the law, Stavros Niarchos had his first business experience in the management of a family-owned flour milling enterprise. His interest in shipping found expression in the formation of a shipping pool for deliveries of grain from Argentina which demonstrated the economy of employing larger vessels than those previously engaged in that trade.

Utilizing this concept, Niarchos went into the shipping business on his own, and in the late thirties was operating a number of large freighters and branching out from the grain trade into world operations. With the advent of World War II, he turned his ships over to the Allies and joined the Greek navy on convoy duty aboard a lend-lease destroyer. Later he served as aide to the Naval Attache in the Greek Embassy in Washington and subsequently took part in the defense of Greece against communist attack.

Half his pre-war fleet had been sunk during hostilities, but with the surviving vessels and others that he acquired, he began building for the future with special attention to oil transport. Organizing the first of the World Tankers companies, he launched in 1948 the "World Peace" of 18,000 tons, and in 1949 the "World Liberty"

S. S. Niarchos

of 28,000 tons, both built in the United States. These were followed by the "World Unity" and the "World Concord" at 32,000 tons each, and the "World Enterprise" and the "World Gratitude" at 33,000 each. He also built eight ships in the 20,000-ton class with "Saxon" names, and while these were building, he acquired by purchase or charter the use of a number of 16,000-ton war surplus tankers.

Following the launching of "World Glory" in February, the "World Harmony" of 33,000 tons took to the water at Newcastle-on-Tyne, the largest tanker thus far built in England. It was sponsored by H.R.H. the Duchess of Kent. This was followed quickly by delivery of the "World Gratitude," also of 33,000 tons, built in Germany with a proved speed of over 19 knots. She is believed to be the fastest yet announced among commercial tankers. Mr. Niarchos has seven others of like size and speed under construction or on order. This fleet, built and building, is now the largest independent tanker fleet in the world.

Socony's Naples Plant Wins Safety Award

The Naples refinery of Socony-Vacuum Italiana, S.P.A., has been declared the 1953 winner of the annual safety contest among nine Socony-Vacuum refineries in five European countries. The achievement marks the climax of two years of rapid progress in accident prevention during which the refinery advanced from last place in 1951 to third place in 1952 and to first place in 1953.

A bronze trophy was presented to the refinery's 1,255 employees at ceremonies held in May. Representatives of the company and officials of the Italian government participated.

The contest is held annually by Socony-Vacuum to promote programs of accident prevention throughout the manufacturing installations of its affiliated companies in Europe. Through these safety programs, employees study their work so they can learn to do each job efficiently and safely.

Worthington Pumps for Israel

First units of a $2,100,000 purchase of heavy-duty water pumping equipment manufactured by Worthington Corp. for use in a major irrigation project in Israel were shipped from New York at the end of April. The total purchase consists of nine centrifugal pumps and nine diesel engines, together with gears and auxiliary equipment.

The Worthington equipment will be installed in three pumping stations in Israel to carry water from the Yarkon River, near the Mediterranean coast, southward to the Negev, a distance of some 43 miles. It will supply water for irrigation and other purposes to existing agricultural settlements and will make possible the establishment of many new settlements in the arid Negev region.

Three pumps, each driven by a 2,000 hp, eight cylinder diesel engine, will be installed in each station. The total capacity of the entire system will be 185,220 gallons per minute. The water will be carried through 66-inch pipes manufactured at the Israel plant of the Lockjoint Pipe Co. of Ampere, N. J.

WHERE EXPLOSION HAZARDS EXIST

THIS SAFETY DEVICE IS Essential!

VISIBLE WARNING

& SOUND

G.E.C.

Flameproof

"LITEALARM"

Designed to give visible and audible warning of conditions leading to possible breakdown, (motors overheating, excessive pressures, overspeed, dangerous level of tank fluids, etc.) Easy installation—simple operation. Full details of the "Litealarm" available on request.

For use in oil refineries, power plants and similar installations. Conforms to B.S.S. 229 Group II and III

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Operating all-size

ROTARY RIGS

in **TEXAS** *and*

NEW MEXICO

R. (Cotton) Makin
Residence phone **3-5968**
Office phone **3-3141**
Petroleum Building

MAKIN *Drilling Company*

P. O. BOX 1628 HOBBS, NEW MEXICO

BOOKS

PHYSICAL PRINCIPLES OF OIL PRODUCTION—Morris Muskrat $15.00

PRACTICAL OIL GEOLOGY—Dorsey Hager ..... $ 8.00

PETROLEUM PRODUCTION ENGINEERING—L. C. Uren
"Oil Field Development" ..... $ 8.50

PETROLEUM PRODUCTION ENGINEERING—L. C. Uren
"Oil Field Exploitation" $10.00

PETROLEUM PRODUCTION ENGINEERING—L. C. Uren
"Petroleum Production Economics" ..... $ 8.00

PETROLEUM REFINERY ENGINEERING—N. L. Nelson $10.00

PETROLEUM PRODUCTION (5 Volumes)—Park J. Jones
Vol. I—Mechanics of Production: Oil, Condensate and Natural Gas, 1946 ..... $ 5.00
Vol. V—Oil Production by Gas & Flooding, 1948 ..... $ 6.00

PRINCIPLES OF PETROLEUM GEOLOGY—Wm. L. Russell ..... $ 7.50

PRINCIPLES OF SEDIMENTATION—2nd Edition—W. H. Twenhofel ..... $ 7.70

ROTARY DRILLING HANDBOOK—5th Edition—Brantly $10.00

SAFETY IN PETROLEUM REFINING & RELATED INDUSTRIES—
George Armistead, Jr. $10.00

THE SCIENCE OF PETROLEUM, Vol. 5, Pt. I,
Crude Oils—Benjamin T. Brooks and A. E. Dunston $11.00

THEORY AND PRACTICE OF INDUSTRIAL RESEARCH—
David Bendel Hertz ..... $ 5.50

WORLD GEOGRAPHY OF PETROLEUM—edited by Wallace E. Pratt and Dorothy Good ..... $ 9.20

TO ORDER, WRITE TO:

BOOK DEPT. WORLD PETROLEUM
604 FIFTH AVE., NEW YORK 20, N. Y.

BROTHERHOOD
STEAM TURBINES

For Driving Pumps etc.

Wide range — All types.
Over 40 years' experience.
Hundreds in hand — thousands in service.

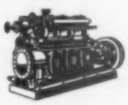
BROTHERHOOD
COMPRESSORS

Air, Gas and Refrigerating.
The widest range in the British Empire — made to suit your requirements.
Thousands in service.

BROTHERHOOD
GENERATING SETS

Turbine driven up to 11,000 KW.
Engine driven up to 340 KW.
Hundreds in hand.

BROTHERHOOD
REFRIGERATING PLANT

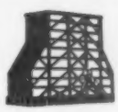


Ammonia, CO_2, Freon, Methyl Chloride, SO_2. Wide range — single and double acting — one or more stages.

BROTHERHOOD
STEAM ENGINES

High speed Vertical
up to 500 B.H.P.
Over one hundred in hand.

BROTHERHOOD
COOLING TOWERS



All types.
Nearly 50 years' experience.

also Manufacturers of all kinds of

PLANT TO CUSTOMERS' OWN DESIGNS

WHY NOT SEND YOUR PROBLEMS TO US?
We shall be pleased to investigate them confidentially without commitment

PETER BROTHERHOOD LTD.
PETERBOROUGH · ENGLAND

BRITISH OIL NEWS

By E. Lawson Lomax

A conference convened by the British government has been sitting in London to consider the problem of pollution of coasts and coastal waters by the discharge of oil from tankers and ships' bilges. It is obvious that, except in grave emergency, the master of a tanker would not jettison any part of his cargo. Pollution from tankships apparently occurs when vessels have been traveling in ballast, after discharging cargo, or when cleaning tanks before going into dry dock for repairs or maintenance. The volume of this residue is not great, but as it does not sink or dissolve, it may be carried by wind and tide to shore where it becomes an accumulating nuisance.

Active steps are being taken in Britain to obviate this, mainly by the major oil companies, who are the owners of fleets of tankers. Depots are being erected at various ports where the ballast can be pumped ashore and after passing through separators of various kinds, the clarified seawater, free from any oil, can be discharged back to sea.

The question, however, is an international one, and until international agreement can be reached, the efforts of one country can give only partial solution. A lead along these lines has been taken and it is hoped that it will result in other nations and countries following suit.

Personnel

Vacuum Oil Co. announces that B. R. Fraser has been appointed manager at Coryton refinery. Mr. Fraser, who was formerly assistant refinery manager, has taken up his post following the resignation of D. M. Glendinning.

As a result of Mr. Fraser's promotion, the following additional appointments have been made: J. W. Bartholomew to the position of assistant manager (process) from that of superintendent of the operating division; W. Kohring to the position of assistant manager (engineering) from that of superintendent of the engineering division; and H. T. Fuller to be superintendent of the operating division, from that of adviser to the refinery management.

Newman Industries Ltd. announces the appointment of W. D. Wilson to the board of directors. Mr. Wilson joined the company in 1935 as works manager. Prior to that he was with Crompton Parkinson Ltd. for 12 years and with Bruce Pebbles & Co. Ltd. for six years. He will continue in his present executive capacity as general manager of the company's Grantham works.

Helicopters Aid Oil Search in Nigeria

Two "Hiller 360" aircraft, powered by a Franklin 178 hp engine, are being used by the Shell-D'Arcy Petroleum Development Co. Ltd. in its search for oil in Nigeria. They are employed in transporting personnel and light equipment between the company's base camp and the various areas in which exploration work is being undertaken, and can also be fitted with external detachable litters for the rapid evacuation of any casualties among the exploration parties.

Plant for Australian Refinery

A de-asphalting tower has been made and shipped by Babcock & Wilcox Ltd. for erection at the Kurnell refinery (near Sydney, Australia) of Australian Oil Refinery Ltd., affiliate of Caltex.

The column is 56 feet overall in height and weighs 117 tons. It was shipped as deck cargo to Sydney and from there floated to the shore near the refinery site as road bridges between these places could not take its concentrated weight.

Royal Dutch Petroleum Company

The board of directors and the managing directors of N. V. Koninklijke Nederlandsche Petroleum Maatschappij (Royal Dutch Petroleum Co.) will propose to the meeting of shareholders to be held in June that a cash dividend of 16 percent be paid in respect to the financial year 1953. This includes an interim dividend of four percent already made payable in February.

The annual reports of Royal Dutch Petroleum Co. and of the "Shell" Transport and Trading Co. Ltd. to be issued in June will include financial statements of the Royal Dutch/Shell group of companies.

Net income of the group for 1953 amounted to £130 million as compared with £125 million in 1952. The increase in mid-1953 of world prices for crude oil and products and higher earnings by Shell Oil Co. in the United States tended to offset to a great extent the drop in tanker freight rates of 40 percent.

Capital expenditures for 1953 were £220 million as against £188 million in 1952, in addition to which £9 million were invested in 1953 in companies in which the group's interest is 50 percent or less. This represents the largest capital expenditure program in the history of the group and is indicative of the financial requirements needed to maintain the business.

Oil Facilities in West Africa

New oil storage facilities, part of a £2 million expansion program designed to improve oil supply service to shipping and inland consumers, are now under construction in West Africa by the Shell organization.

These include new bunkering facilities at Dakar, French West Africa, involving the reclamation of 10 acres of land from the sea; widening and strengthening of breakwaters, enabling tankers of 18,000 dwt to discharge at the new installation; the building of storage capacity of 60,000 tons for diesel and fuel oil, with a later extension to 90,000 tons, as well as for 9,000 tons of bitumen for inland distribution.

At Agapa, the principal port of Nigeria, a new ocean terminal is being built for the handling of all main petroleum products. The site is on 35 acres of swamp land now being recovered by cut and fill methods involving the handling of 400,000 tons of earth, the dredged sand being used for filling in a site for the erection of bitumen tanks.

Fourteen storage tanks are being built, together with modern oil handling facilities. Future plans for Lagos harbor envisage dredging to provide berthing facilities for 18,000 dwt tankers. Upcountry depots are being established at Kano, an important air center in the north of the country, and at Jos, situated in the mining zone of the central plateau.

Venezuelan Agricultural Service

The new headquarters of the Agricultural Service for Venezuela, sponsored by Cia. Shell de Venezuela, consisting of offices, laboratories, workshops and an insectary, were formally opened in April by the Minister of Agriculture, the new buildings being blessed by the Archbishop of Caracas, Primate of Venezuela.

This service has been set up to assist in the development of agriculture in Venezuela by investigating problems affecting basic agriculture and giving advice to farmers. It is divided into four sections: agronomy, entomology, phytopathology and agricultural engineering, each section being headed by an expert on the subject who is assisted by trained staff.

It is expected that this practical effort to aid Venezuela's agricultural development will result in improved yields of rice, cotton, sugar cane and other crops throughout Venezuela.

Anglo-Iranian Oil Co. Ltd.

At a meeting of the board of Anglo-Iranian Oil Company, Ltd., held on May 6, it was decided to recommend a final dividend on ordinary stock of 25 percent plus a cash bonus of 2/6d for the year 1953. The corresponding figures for 1952 were a final dividend of 25 percent and cash bonus of 1/- per £1 stock.

No operations of the company or its subsidiary companies have taken place in Iran in 1953, but the companies' assets and liabilities in that country have been included in the group accounts at substantially the same figures as in 1952.

The main statistics relating to the profits for 1953, together with corresponding figures for 1952, are set out below:

	1953 £	1952 £
Consolidated profit before U. K. taxation	43,827,585	47,061,638
Net consolidated profit for year	23,589,434	24,395,294
Parent company's net profit for year	24,382,850	25,165,966
Amount brought forward from previous year	2,043,231	1,996,624
Dividends paid on preference stocks	1,071,234	1,071,234
Interim dividend of 5% paid on ordinary stock	1,006,875	1,006,875
Final dividend and cash bonus now recommended	7,551,563	6,041,250
General reserve	14,000,000	16,000,000
To be carried forward to next year	2,045,520	2,043,231

Institute of Fuel Luncheon

The annual luncheon of the Institute of Fuel was held at the end of April under the presidency of Dr. W. Idris Jones. Among the guests were: Sir Christopher Hinton, deputy controller of atomic energy, ministry of supply; Hon. W. Walter Butterworth, minister of the U. S. Embassy to the Court of St. James; Dr. E. D. Adrian, president of the Royal Society; several members of Parliament, representatives of government departments and presidents of other scientific and technical institutions.

In his reply to the toast of the guests, Sir Christopher Hinton made some comments on British industrial resources. He noted that mineable coal in the country would probably be exhausted in 200 years, and that it was desirable to have recourse to other sources of heat and power so that coal could be conserved and used as a basic material for chemicals. The prospects for atomic energy production are promising, he said, and plants now under construction will be able to feed power into the grid. The cost would be higher at first than power from coal by about one penny per unit, but later would be competitive as the cost of coal will rise and the cost of atomic energy will fall with added experience in its production.

Drilling in Papua

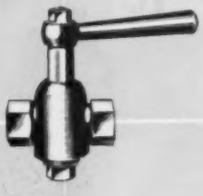
Drilling of Omati No. 2, the eighth well to be sunk in Papua by the Australian Petroleum Co. Ltd. & Island Exploration Co. Ltd., has started. These companies are associated with Anglo-Iranian, American and Australian interests.

Equipment capable of drilling to 15,000 feet is being used on this site, which is two miles west of Omati No. 1, which last year reached 13,743 feet at which depth the hole caved, freezing drill pipe and bit. Special equipment is being used in an endeavor to allow operations to continue.

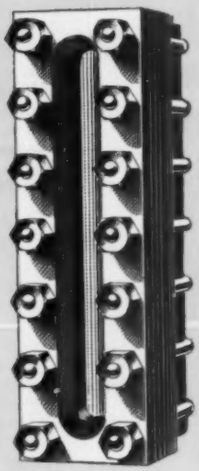
Two geological exploration and three seismic parties are continuing to map the rock formations of Papua.

Klingerise YOUR PLANT

COCKS



GAGES



VALVES

INSTALL Klinger FITTINGS

Write for the Klinger Master Catalog which describes the complete range of Klinger products, compressed asbestos sheet packings for all purposes, valves, cocks, level gages, synthetic and silicone rubbers.

RICHARD KLINGER LIMITED, KLINGERIT WORKS, SIDCUP, KENT, ENGLAND

Agents throughout the World

Manufacturing Licensees for Canada

JOSEPH ROBB & COMPANY, LIMITED
5575, COTE ST. PAUL ROAD, MONTREAL, 20, CANADA
Telephone: WILBANK 3181 Cable: ROBCO
Branches at: SYDNEY, N.S., HALIFAX, N.S., OTTAWA, Ont., TORONTO, Ont., HAMILTON, Ont., WINNIPEG, Man., EDMONTON, Alta., VANCOUVER, B.C.

Manufacturing Licensees for U.S.A.

THE KLINGER CORPORATION OF AMERICA
95, RIVER STREET, HOBOKEN, NEW JERSEY, U.S.A.
Telephone: HOBOKEN 2-7915 Cable: KLINGDALE
New York
Telephone: WHITEHALL 3-8996

OIL COMPANY STAFF CHANGES

J. R. C. Boyce

J. R. C. BOYCE has been appointed to the position of secretary and treasurer of Trinidad Leaseholds (Canada) Ltd. Mr. Boyce, who holds an associate membership in the Chartered Institute of Secretaries of Joint Stock Companies, London, England, first joined Trinidad Leaseholds Ltd. in 1930 in Trinidad, B.W.I.

H. H. WEST was elected a vice president of The Ohio Oil Co. at the organization meeting of the board of directors, J. C. Donnell II, president, has announced. Mr. West is secretary and a director of the company.

Mr. West joined Ohio in 1922 as a stenographer in the general office. He became secretary to former President O. D. Donnell, who was then treasurer, in 1926 and his work in that position led to his appointment in 1941 as assistant to the president. In 1948 he was given the additional duties of assistant secretary, and served in both capacities until his election as secretary in 1951, being elected to the board of directors in 1953. The board also re-elected all other officers.

BRYANT F. KENNEY, chairman and managing director of Standard-Vacuum Refining Co. of South Africa (Pty.), has been elected to the board of the parent company in New York where he will make his headquarters.

Joseph B. Nolan of Capetown has been named shareholders' representative in the Union of South Africa and will coordinate all Stanvac activities in that country. He will also be chairman of the board of Stanvac's marketing affiliate, Vacuum Oil Co. of South Africa (Pty.) Ltd., and of Standard-Vacuum Refining Co. of South Africa (Pty.) Ltd. Charles E. Solomon was chosen managing director of the marketing company to succeed Mr. Nolan.

John B. Hanna was named to succeed Mr. Kenney as managing director of the refining subsidiary. He is an American expert who went to Durban two years ago to supervise construction of the new plant.

B. F. Kenney

J. B. Hanna

J. G. WILSON, formerly chief engineer at Shell Oil Company's refinery at Wood River, Ill., has been appointed manager of the manufacturing engineering department at the company's head office in New York, succeeding W. F. Court, who is retiring for reasons of health after 30 years' service.

Mr. Wilson joined Shell in Mexico in 1933 as an assistant engineer and five years later was assigned to San Francisco. He became assistant department manager in New York in 1948 and chief engineer at Wood River in 1952.

MORRIS M. SLOTNICK, whose oil industry background spans nearly a quarter century, has joined the Standard-Vacuum Oil Co. as geophysical consultant and advisor for the company's exploration activities in the Far East.

Dr. Slotnick joined Humble Oil & Refining Co. in 1930 as a research mathematician and was chief mathematician in the company's exploration department from 1936 until early this year. He is a former editor of *Geophysics*, technical journal of the Society of Exploration Geophysicists.

WALTER UHLE has been appointed general manager of the supply and distribution department of California Texas Oil Co. Ltd.

Mr. Uhle was formerly assistant to the president of Mid-East Crude Sale Company Ltd., and has been manager of the Caltex supply and distribution department since 1951. During World War II he served as a member and chairman of petroleum supply committees in the West Indies.

C. A. Willis

B. J. Farwig

C. A. WILLIS has been appointed director of sales for Cities Service Oil Co. (Del.) and B. J. Farwig has been made a general sales manager, according to an announcement from Chicago marketing headquarters by E. L. Stauffacher, vice president and manager of the marketing division. A. N. Haenggi becomes assistant general sales manager under the expansion program.

Mr. Willis has been with Cities Service since 1922, as assistant sales manager from 1923 to 1927 and general sales manager since 1927. Mr. Farwig came with Cities Service in 1925 as assistant general traffic manager. In 1927 he became district manager of wholesale sales, in 1930 sales manager for the Oklahoma division, and in 1935 assistant general sales manager of the company. Mr. Haenggi has been with the marketing division since 1930 and since 1952 has been assistant manager of the St. Paul marketing district.

R. E. LUDT has been made an assistant vice president, fiscal division, of California Texas Oil Company. His connection with the company dates back to 1933 and has been mainly concerned with financial operations including service as cashier, assistant treasurer and assistant to the fiscal vice president. For the past five years he has been in charge of the company's financial planning department.

J. F. Gow

JACK F. GOW has been appointed to the newly created post of manager of public relations and publications department of the Eastern division of the Tide Water Associated Oil Co. with headquarters in New York City.

Mr. Gow, a former newspaperman, joined Tide Water in 1946 as employee publications editor and publicity representative for the firm's Bayonne, N. J. refinery. He became supervisor of all divisional publications in 1950 and in 1952 was named public relations representative for the eastern division.

FRANK A. MORGAN has resigned his position as vice president and manager of exploration of Richfield Oil Corp. after 33 years spent in oil exploration work. Immediate plans, following his resignation, include only "a long delayed vacation in Alaska," but he intends to continue to be active in the oil industry, possibly as an independent consultant.

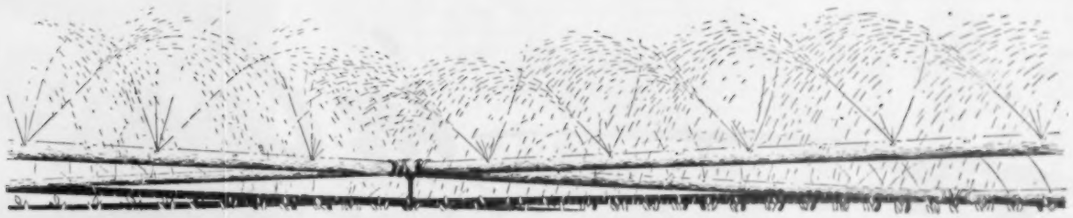
HOWARD G. VESPER, vice president of Standard Oil Co. of California, has been elected president of the Industrial Research Institute, Inc. E. D. Reeves, executive vice president of Standard Oil Development Co., New York, was named to succeed Mr. Vesper.

SIDNEY J. STACEY has been appointed assistant to the president of California Texas Oil Co. He has been with the company since 1927 and prior to his present assignment was controller. He is a member of the Controller's Institute of America and the Financial and Accounting Committee of the American Petroleum Institute.

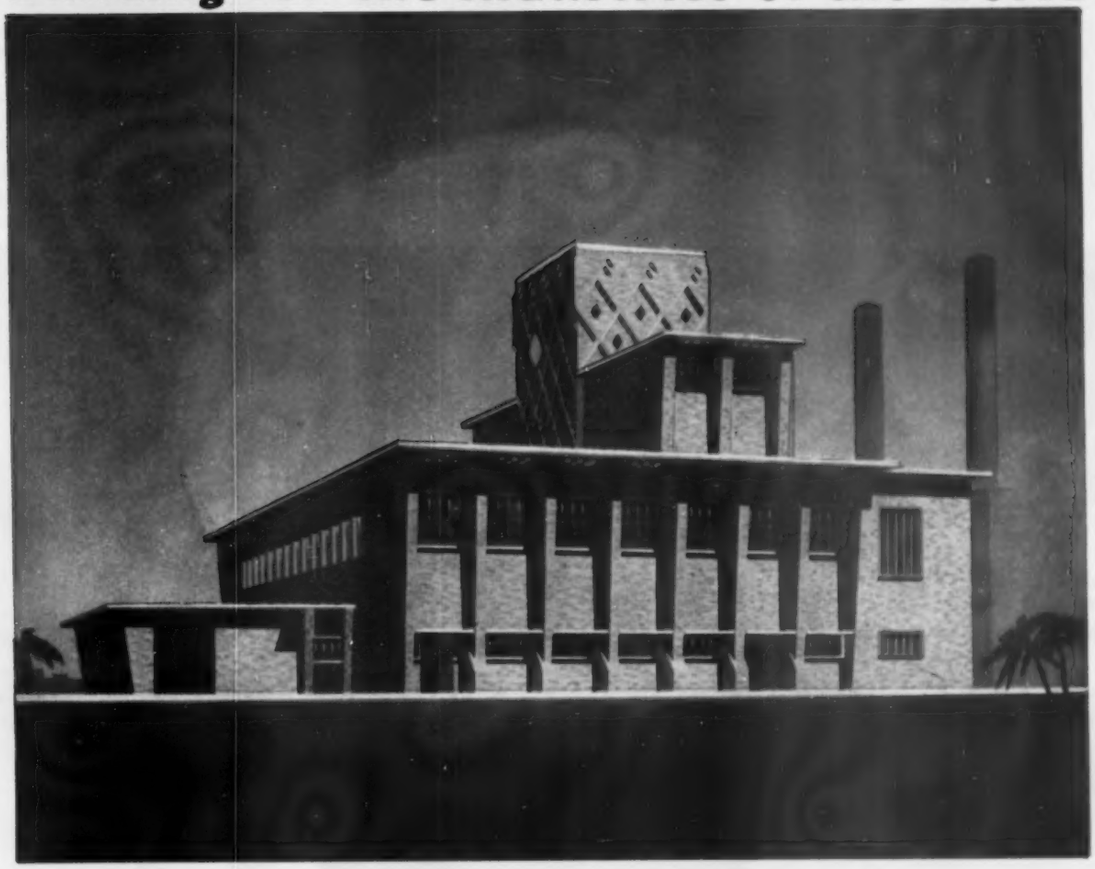
The company also has announced the appointment of D. L. McCarroll as comptroller. He first joined Caltex in 1937, left to join the Air Force in 1942, and returned as special accountant in taxes in 1946.

S. J. Stacey

D. L. McCarroll



Building for the Industries of the World



WATER

Kuwait Seawater Distillation Plant to the design of the Consulting Engineers,
Ewbank & Partners, and Architects, Farmer & Dark, F/F.R.I.B.A.,

was constructed by

THE GULF ENGINEERING COMPANY (KUWAIT) LTD.

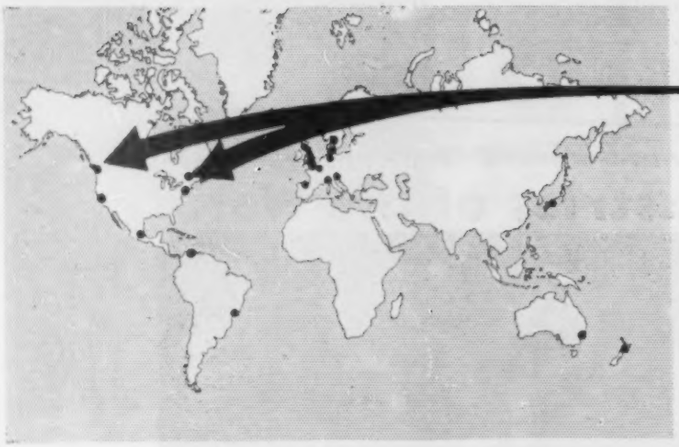
part of the organisation of

RICHARD COSTAIN LIMITED BUILDING & CIVIL ENGINEERING CONTRACTORS

DOLPHIN SQUARE, LONDON, S.W.1 VICTORIA 6624

BRANCHES: MIDDLE EAST · RHODESIA · NIGERIA

International Paints *in Canada*



At Montreal and Vancouver, associated "International" factories are producing paints for a variety of purposes. Their on-the-spot technical experience of paints for Canadian requirements is no small contribution to the wealth of knowledge accumulated by the world wide group of International factories.

"International" have associated Companies in 15 other countries and close co-operation ensures the ability to supply the right paint for anything, anywhere. "International" products include METAL PRIMERS and ALUMINUM PAINT for storage tanks; DRUM PAINTS, and ENAMELS for general purposes.

International Paints Ltd.

Head Office: GROSVENOR GARDENS HOUSE, LONDON, S.W.1

TELEPHONE: TATE GALLERY 7070 (15 LINES)

TELEGRAMS, INLAND: CORROFOIL, SOWEST, LONDON. OVERSEAS: CORROFOIL, LONDON

REGISTERED TRADE MARK

MAIN FACTORY IN U.K. FELLING-ON-TYNE

ASSOCIATED FACTORIES IN

AUSTRALIA	SYDNEY	GERMANY	HAMBURG	NEW ZEALAND	WELLINGTON
BRAZIL	RIO DE JANEIRO	ITALY	GENOA	SPAIN	BILBAO
CANADA	MONTREAL	ITALY	TRIESTE	SWEDEN	GOTHENBURG
CANADA	VANCOUVER	JAPAN	KOBE	U.S.A.	NEW YORK
DENMARK	COPENHAGEN	MEXICO	MEXICO CITY	U.S.A.	SAN FRANCISCO
FRANCE	LE HAVRE	NORWAY	BERGEN	VENEZUELA	MARACAIBO

F. M. Jayne

F. M. JAYNE has been elected a vice president of Standard Oil Company of California. He joined the company as a clerk in the Richmond refinery in 1934, was appointed assistant controller in 1947, and two years later was made secretary of the executive committee. He served in the Air Corps in World War I and was with the Petroleum Administration for War in World War II.

C. J. LIVINGSTONE has been made director of product application of Gulf Oil Corp. and will be responsible for the development of new products and the improvement of existing products for the company.

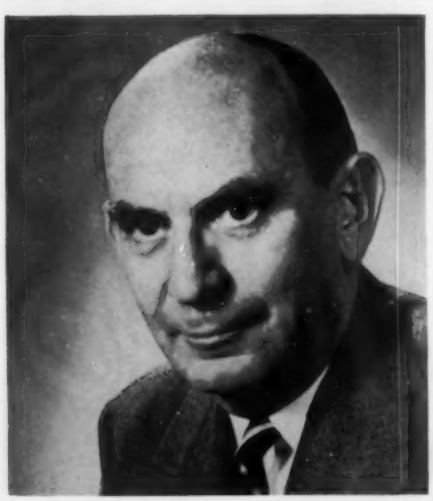
M. C. Enright has been appointed director of sales promotion for the domestic marketing department.

W. C. Havelin has been named marketing manager of resale outlets, and will be responsible for the company's business through retail service stations.

All three men are veterans of long service with Gulf.

G. L. MACPHERSON has been elected a director of the Imperial Oil Ltd. board at a meeting of the directors. Mr. Macpherson fills a vacancy created when the board membership was increased from nine to 10.

J. R. White was re-elected president and G. L. Stewart chairman of the board. F. G. Hall, W. O. Twaits, J. K. Jamieson and Trevor F. Moore were re-elected vice presidents. All these officers are directors. Other directors are: C. E. Carson, J. W. Hamilton, and Earl S. Neal. Officers reappointed were: Colin D. Crichton, general secretary; J. H. Spence, comptroller; and D. W. McGibbon, treasurer. J. F. Barrett was re-appointed counsel.



G. L. Macpherson

BRANDON H. GROVE has been appointed assistant to Robert Siegel, director in charge of Middle East affairs for Socony-Vacuum Oil Co.

Mr. Grove received a B.S. degree in geology in 1930 and a Ph.D. degree from the University of Chicago in 1934. He joined Socony-Vacuum's producing department as a geologist in 1935 and since then has represented the company on various producing and foreign trade assignments in Latin America, Europe and the Middle East. From 1943 to 1946 he was on loan to the Foreign Economic Administration, becoming general manager of Socony-Vacuum operations in Egypt and the Red Sea area in 1951 and being elected president of Socony-Vacuum Oil Company of Egypt when that company was formed in January 1952. A year later he also became managing director of Socony-Vacuum Oil Co. (Sudan) Ltd.

Francis M. Smith, a member of Socony-Vacuum's foreign trade committee since 1948, has been elected to succeed Mr. Grove in both offices and will continue as foreign trade committee member with headquarters in Cairo.

LLOYD L. DODDS, landman, has been promoted to assistant regional land superintendent of Continental Oil Company's western region exploration department. Robert L. Hardesty, landman, has been promoted to division land superintendent. Marc O. Miller, geophysicist, has been promoted to geophysical supervisor. Both Messrs. Dodds & Miller will continue to make their headquarters in Los Angeles and Mr. Hardesty's headquarters will be in Olympia.

Mr. Dodds joined Conoco's production department at Los Angeles in 1945, becoming a landman for the company's western region in 1949. Before joining Conoco, he was associated for nine years with another oil firm at Los Angeles.

Mr. Hardesty was associated with Travelers Insurance Co. and Dun & Bradstreet in Los Angeles prior to joining Conoco in 1950. He transferred from Los Angeles to Olympia early this year.

Mr. Miller joined Continental in 1948 in Texas and transferred to Los Angeles the following year.

No standing still

Under to-day's conditions, the price of uncertainties, fumblings and second attempts is prohibitive at any stage, and nowhere more certainly so, than in plant erection. It requires a wide, practical experience of process engineering for the petroleum and petrochemical industries — like that possessed by D. & C. and William Press Ltd. — to ensure that operations keep abreast of to-day's development tempo.

D & C AND WM. PRESS LTD.

civil, mechanical and chemical construction engineers at home and abroad

Head Office: 27 ASHLEY PLACE, LONDON, S.W.1. Tel: VICtoria 9751 (6 lines). Grams: Demcopress, London

T.A.6345

New Westinghouse International Division

M. S. Strickler has been appointed manager of the new general products division of Westinghouse Electric International Co., it was announced recently by J. D. Nickle, general sales manager.

Mr. Strickler joined Westinghouse in 1920 as a salesman. Seven years later he was made office manager of the Westinghouse branch in Mexico City. He returned to New York in 1927 to reenter sales work and later was manager of industrial sales and of lighting apparatus, his most recent position.

The division has been formed to handle lighting, secondary distribution equipment, small motors, standard control and welding apparatus as well as specialty products including elevators, air conditioning and air handling apparatus.

Davison Starts Superphosphate Production

Production of triple superphosphate has been started in the $10,500,000 plant erected by the Davison Chemical Corp. on a 45-acre site near its phosphate rock mining properties in Bartow, Florida and will be stepped up as soon as possible to the plant's 200,000 tons a year rated capacity.

Triple superphosphate, a concentrated form of superphosphate used as a plant food to supply the essential element phosphorus, is one of the most rapidly-expanding agricultural chemicals, because of both economic and agronomic considerations. The plant will make the company the second largest producer of the chemical.

Consolidated Engineering Corp. of Baltimore was the construction contractor for the plant, with the Dorr Co., Stamford, Conn., as architect-engineers.

E. Norris

Houdry Promotes Norris

Eugene Norris, chemical engineer, has been promoted from process engineer to commercial development engineer of Houdry Process Corp., Philadelphia, and will provide technical assistance to licensees on all Houdry processes in addition to engaging in sales activities.

Mr. Norris has been associated with the development of moving bed catalytic cracking processes since their inception. He holds several patents in the field of petroleum refining.

Since joining Houdry, he has served with the technical service division and the process section of the engineering department.

Ewbank Joins Houdry Patent Department

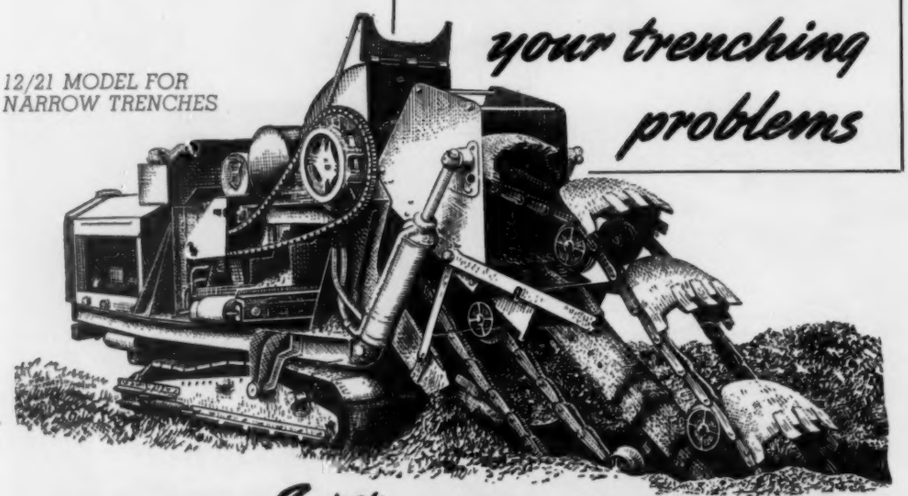
John Ewbank, chemical patent attorney, has joined the patent department of Houdry Process Corp., Philadelphia, Pa. A graduate of Purdue University and the University of Indiana Law School, Mr. Ewbank has had experience in chemical research, patent litigation, the preparation of patent applications, and was engaged more recently in private law practice in Philadelphia. His present position with Houdry entails the prosecution of patent applications and related work.

Mr. Ewbank is a member of the American Patent Law Association, the Philadelphia Patent Law Association, and the American Chemical Society.

J. Ewbank

The answer to all your trenching problems

12/21 MODEL FOR NARROW TRENCHES

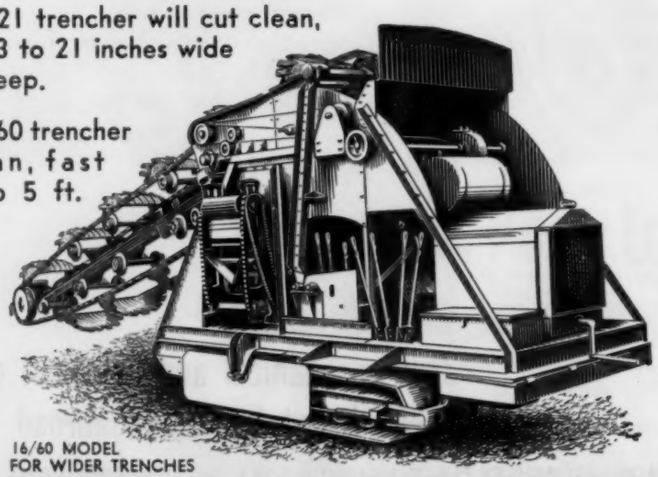


ALLEN *Super Duty* TRENCHERS

World-renowned, all-British ALLEN plant is recognised as the finest obtainable. For hard work, long life, freedom from breakdown and economical maintenance, it has no equal anywhere.

The Model 12-21 trencher will cut clean, fast trenches 13 to 21 inches wide down to 6 ft. deep.

The Model 16/60 trencher will cut clean, fast trenches up to 5 ft. wide down to 14 ft. deep.



Illustrated catalogues sent on request.

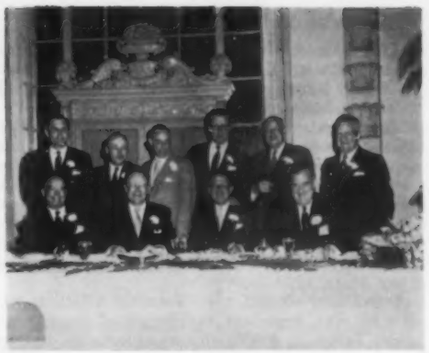
16/60 MODEL FOR WIDER TRENCHES

JOHN ALLEN & SONS (OXFORD) LTD. COWLEY OXFORD

First Quarter Earnings for Thirty Companies Up 15.1 Percent Over 1953

Financial reports of 30 major oil companies gathered by WORLD PETROLEUM for the first quarter of 1954 show a gain in net income of $72,254,000, or an increase of 15.1 percent over the same period of 1953. Following is a tabulation of these figures by company:

	First Quarter Net Income (Thousands of Dollars)		Per Share of Common	
	1954	1953	1954	1953
Amerada	$ 4,640	$ 4,346	$1.47	$1.38
Atlantic	11,025	11,171	1.19	1.21
Chicago Corp.	1,988	1,414	.58	.40
Cities Service	15,613	16,228	4.02	4.17
Continental	11,600	10,000	1.19	1.03
Gulf	38,128	35,629	1.55	1.45
Houston	1,766	1,916	1.33	1.45
Imperial	13,665	9,776	.45	.33
Lion	3,469	2,840	1.12	.92
Ohio	10,186	10,435	1.55	1.59
Panhandle	289	200	.18	.13
Phillips	19,162	17,755	1.31	1.22
Plymouth	1,920	2,274	.79	.94
Richfield	6,634	6,648	1.66	1.66
Seaboard	1,457	1,153	1.19	.95
Shell	33,197	25,533	2.42	1.90
Sinclair	19,738	16,667	1.60	1.36
Socony-Vacuum	46,000	44,000	1.29	1.26
Std. of Calif.	52,359	42,016	1.83	1.47
Std. of Ind.	27,706	28,050	1.80	1.83
Std. of Kentucky	3,373	2,638	1.29	1.01
Std. of N. J.	146,000	126,000	2.41	2.07
Std. of Ohio	4,461	4,418	1.06	1.05
Sunray	6,071	6,131	.56	.55
The Texas Co.	50,848	42,682	1.85	1.55
Texas Gulf Prod.	1,513	795	1.24	.65
Tide Water	8,888	8,748	.69	.68
Union Oil	8,445	7,885	1.42	1.32
Venezuela Pet.	1,060	700	.26	.17
Wilcox Oil Co.	126	225	.45	.80
Total	$551,327	$479,073		



The New York Chapter of Nomads paid special honor to its past presidents at a party held the evening of May 3rd at the Hotel Biltmore in New York City. The following are shown in photograph: (Left to right, standing): Russ V. McIntire (1953), Baker Oil Tools; H. B. Book (1951), Reed Roller Bit Co.; John H. Baird (1940, 1946), Baird Supply Co.; J. W. Reed (1949), Cooper Bessemer Corp.; A. A. Dill (1952), Axelson Manufacturing Co.; and A. V. Simonson (1947), A. V. Simonson & Co. (Seated): J. A. Thomas (1941), retired; W. J. Campbell (1944), Petroleum Machinery Corp.; Val R. Wittich, Jr. (1948); and Henry J. McAdams (1950), Jones & Laughlin Supply Co. Other past presidents of the chapter who were unable to attend were Russell D. Heath (1942), Le Roi Co.; F. J. Olson (1943), now living in California; and E. H. Trammell (1945), who now resides in Mexico.

GLASSES & GASKETS
MAGNIFYING
ERNST WATER COLUMN & GAGE CO.
Send for Catalog, LIVINGSTON, N. J.
ALL SIZES TO FIT YOUR GAGES & VALVES

Cat Reformers for California Standard

Contract for design and construction of twin catalytic reforming plants at Standard Oil Company of California's Richmond and El Segundo refineries has been awarded to the Bechtel Corp.

The two projects, scheduled to get under way immediately, comprise the nucleus of a $30,000,000 refinery program designed to increase substantially the quality and octane ratings of Standard's motor gasolines. Both plants are expected to be ready for operation by the spring of 1955.

TRIAD OIL CO. LTD.

E. H. TANNER, President

takes pleasure in announcing the appointments of

•

E. H. VALLAT

Vice-President in Charge of Exploration

•

J. W. Jackson

Vice-President in Charge of Operations

Specialists in CAST

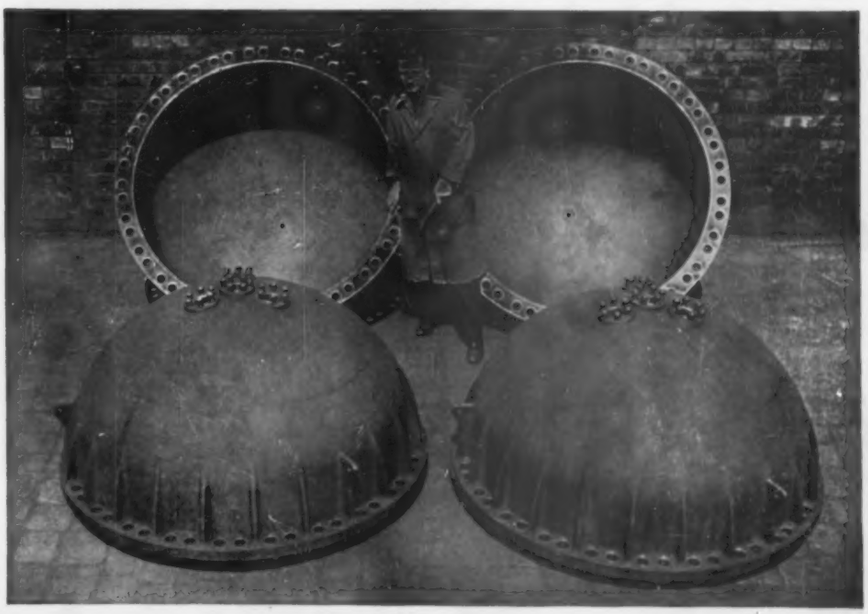
UP TO 10 TONS EACH IN WEIGHT

FOR THE CHEMICAL AND OIL INDUSTRIES in

MANGANESE BRONZE
ALUMINUM BRONZE
PHOSPHOR BRONZE
GUNMETAL
GREY & ALLOY CAST IRON

ALL TO BRITISH OR AMERICAN SPECIFICATIONS

PRESSURE VESSELS



2 TONS EACH IN MANGANESE BRONZE BY PERMISSION OF ONE OF OUR CUSTOMERS

PHONE STOKE-ON-TRENT 87303/4

BILLINGTON & NEWTON LTD.

LONGPORT • STOKE-ON-TRENT • ENGLAND

GRAMS BRONZE LONGPORT

W. J. Stebler

GATX Executive Changes

Several executive changes in General American Transportation Corp. were announced by Lester N. Selig, board chairman, following the annual meeting of the company.

Sam Laud, who has been with the company for 38 years and has been president since 1945, became vice chairman. William J. Stebler, formerly executive vice president, is the new president. Mr. Stebler, who served for eight years as vice president in charge of manufacturing prior to his promotion to executive vice president in 1951, has been associated with the company since 1928.

Other new officers are: Herman Altschul, who will be vice president in charge of freight car sales; James S. Frey, who was elected a director of the corporation at the annual meeting, vice president in charge of manufacturing; and Frank E. Selz, elected vice president in charge of the newly created plastics division. Spencer D. Moseley was named assistant to the president.

L. W. Shank

Ethyl Promotes Shank

Louis W. Shank has been promoted to suggestion system manager of Ethyl Corporation. The new suggestion system which he will direct became effective June 1 throughout the company.

Mr. Shank graduated from Johns Hopkins University in 1922 with a BA degree. He began his career with Ethyl in the former Baltimore division and has filled several executive positions in the sales department. He was manager of the Baltimore division from 1935 to 1939, manager of the Tulsa division from 1939 to 1947, and southern regional manager of operations from 1947 until 1950, when he was transferred to the New York office as assistant to the vice president in charge of sales.

Lutey McCullough Public Relations Director

O. J. McCullough, vice president, McCullough Tool Co., has announced the appointment of Jack Lutey as eastern division public relations director, succeeding Robert W. Smith, who several months ago became eastern division sales manager.

Mr. Lutey studied law at the National University in Washington, D. C., receiving his L.L.B. in 1940, and became a special agent for the Federal Bureau of Investigation during the next eight years.

In 1948 he turned to public relations work, being active in several Houston concerns before joining McCullough in 1953. He worked in the McCullough service department at Houston and later on in the sales department as a part of an intensive trainee program before assuming his new position.

J. Lutey

ECONOMICS OF MORE EFFICIENT SHOT HOLE DRILLING—NO. 3

COST REDUCTION CREATES NEW BUSINESS

NEW BUSINESS CREATES NEW WEALTH

Basic economics proves that business volume increases as unit costs decrease. This increased production potential applies to seismic exploration.

Although the basic costs of keeping geophysical crews in the field have risen in recent years, increased crew efficiency—with more modern tools and methods—reduces man-hours and operating costs per unit of work, reducing cost per profile and stretching the productivity of each seismic dollar.

Faster, more efficient drilling with Hawthorne "Blue Demon" Bits has, in many cases, provided the equivalent in shot hole production of an extra drill . . . reducing unit costs as much as 50%. This increased party capacity provides for further surveys in the budget investment . . . increased contract business for the seismic operator.

Drilling conditions will vary, but you can count on decreased costs per profile . . . increased party potential . . . in increasing crew efficiency with "Blue Demon" Bits.

Before using HAWTHORNE BITS . . .

WESTEX EXPLORATIONS, INC.
West Texas Division
INVOICE: April, 1954

Recording Costs	$ 9,800.00
Cost of Drills (3)	6,000.00
Other Costs, including bits	7,850.00
Month Total	$23,650.00
Number of Profiles — 160	
Cost per Profile	$147.81

While using HAWTHORNE BITS . . .

WESTEX EXPLORATIONS, INC.
West Texas Division
INVOICE: May, 1954

Recording Costs	$ 9,800.00
Cost of Drills (3)	6,000.00
Other Costs, including bits	6,233.50
Month Total	$22,033.50
Number of Profiles — 200	
Costs per Profile	$110.16

U. S. PATENTS
2,619,634 2,666,622
OTHERS PENDING

WRITE FOR ILLUSTRATED CATALOG

HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS

4007

Dr. D. G. Braithwaite

National Aluminate Vice President

Dr. David G. Braithwaite, formerly assistant vice president and production manager of the catalyst division, has been named a vice president of National Aluminate Corp. He will continue to head production activities of the catalyst division in addition to assuming new management duties.

Mr. Braithwaite spent several years in the company's ion exchange division, where he rose to associate director of research and moved to the catalyst division as production manager when full scale cracking catalyst production was resumed in 1949 at Nalco's No. 2 plant. He directed work on the catalyst division's west coast plant (which recently began operations at South Gate, Calif.) in 1943, and was named an assistant vice president in February 1953.

Horner Joins Core Laboratories

William L. Horner has been elected vice president of Core Laboratories, Inc., international petroleum service firm of Dallas, Texas, and will be manager of its reservoir engineering operations. Mr. Horner is a specialist in the field of conservation, pressure maintenance, water flooding, unitization projects and property evaluation work. He will head Core Lab's expanded activities in similar services, including the management of production properties.

Since 1943 he has been with Sunray and Barnsdall companies as manager of secondary recovery and later as chief engineer of production. In 1952 he was elected vice president in charge of Sunray reservoir production activities. He is the author of numerous technical and operating papers and has served in various national offices for AIME, API and IPAA. He is a member of the Interstate Oil Compact Commission.

W. L. Horner

Stone & Webster Engineer

F. W. Argue has been named engineering manager of Stone & Webster Engineering Corp. with headquarters in Boston. Mr. Argue joined the company in 1941 and has participated in engineering society technical affairs, particularly in the field of power generation. He was named assistant engineering manager in November 1952.

W. R. Ryan, vice president, has been named senior consulting engineer of the corporation and placed in charge of its engineering report and appraisal activities.

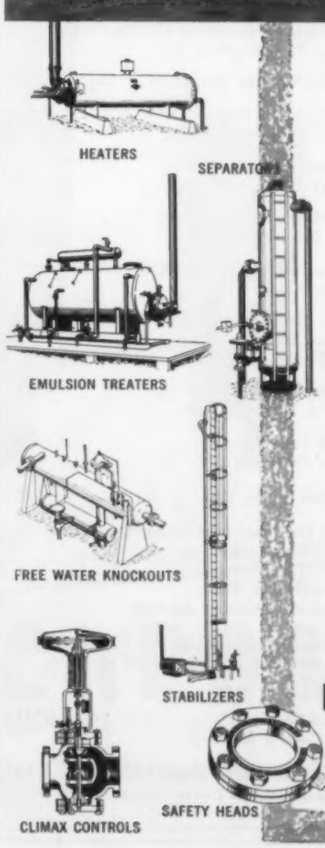
New De Laval Sales Office

The announcement of a new sales office in St. Louis and the appointment of William F. Young as sales engineer in charge has been made by the De Laval Steam Turbine Co., Trenton, N. J. The new office is located at 25 South Bemiston Ave., St. Louis, Mo., and will operate as a branch sales office of De Laval's Chicago district office.

W. F. Young

EFFICIENCY BS&B RELIABILITY

Wherever Oil & Gas Are Produced...



You'll Find BS&B Ready To Serve You!

During the more than 60 years that the petroleum industry has been developing into its present worldwide importance, BS&B has been serving it by anticipating the constantly changing problems and needs of the industry... and by producing the world's finest oil and gas field processing and storage equipment to meet them. If you have an equipment problem, why not talk it over with your BS&B Man? He'll gladly analyze it and recommend the best solution for you. Or write to us direct... there's no obligation!

From BS&B for the Petroleum Industry

Oil and gas separators... welded steel tanks...wood tanks... free water knockouts... low temperature separation units... gas dehydrators... stabilizers... heaters... gas desulfurizers ... chemical feeders... safety heads... walkways and stairways... "Climax" automatic control equipment.

bolted steel tanks

BLACK, SIVALLS & BRYSON, INC.

Dept. 12-CQ6
7500 East 12th St., Kansas City 26, Missouri
Cable Address: Exblack, Kansas City, Mo.

BANFF OIL LTD.

HEAD OFFICE:

809 Eighth Ave. West

CALGARY, ALBERTA

CANADA

From the Arctic to the Tropics-

Geolograph's mechanical well logging unit is easily transported; is jungle-proof and desert-proof! Neither sand storm, humidity nor blazing sun affects Geolograph's accuracy in providing a foot-by-foot record which shows depth, connections and down time — at all times! That's why you always save when you log as you drill, with Geolograph!

GEOLOGRAPH

MECHANICAL WELL LOGGING SERVICE

P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex.—Liberal, Kan. Oklahoma City, Oklahoma—Abilene, Houston, Odessa, Lubbock and Wichita Falls, Texas—Bakersfield, Cal.—Shreveport and Baton Rouge, La.—Casper, Wyo.—Glendive, Mont. Sterling, Colo.—Calgary and Edmonton, Alberta, Canada—Regina, Saskatchewan, Canada

ADVERTISERS' INDEX

(Advertising Agencies in Italics)

John Allen & Son (Oxford) Ltd. 88
Howard Bull Ltd.

Anglo-Iranian Oil Co. Ltd. 67
S. H. Benson Ltd.

Arabian American Oil Co., Inc. 9

Atlantic Refining Co. 21
N. W. Ayer & Son, Inc.

Banff Oil Limited 92

Barnes & Bell Ltd. 69

Billington & Newton Ltd. 89

Black, Sivalls & Bryson, Inc. (Export Div.) 91
R. J. Potts-Calkins & Holden, Inc.

British Ropes Ltd. 34
D. J. Keymer & Co. Ltd.

Peter Brotherhood Ltd. 81
Rooster Publicity Ltd.

The Butterley Co. Ltd. 26
Rowlinson-Broughton

California Texas Oil Co., Inc. 29
Erwin, Wasey & Co., Inc.

The Cape Asbestos Co. Ltd. 93
Taylor Advertising Ltd.

Chicago Bridge & Iron Co. 94
Russell T. Gray, Inc.

Climax Rock Drill & Engineering Co. Ltd. 71
Technical Advertising Service Ltd.

Richard Costain Ltd. 85

Crane Packing Ltd. 10
Ruddock Advertising Agency
J. Ainsborough Everiss & Ass.

Dunlop Rubber Co. (G.R.G. Overseas) Ltd. 13
Chas. F. Higham Ltd.

Dunlop Rubber Co. (Dunlopillo) Ltd. 77
Chas. F. Higham Ltd.

E. I. du Pont de Nemours & Co., Inc. 27-28
Charles R. Rumrill & Co.

Ernst Water Column & Gage Co. 89

Flexible Drives (Gilmans) Ltd. 79
Boswell & Barratt Ltd.

Foster Wheeler Corporation 17-18
Rickard & Co., Inc.

General Electric International 5
Grant Advertising, Inc.

General Electric Co. of England Ltd. 80
Kingscott Ltd.

Geolograph Mechanical Well Logging Service 92
Lowe Runkle Company

Gulf Oil Corporation 19
Young & Rubicam, Inc.

J. P. Hall & Sons Ltd. 79
Rooster Publicity Ltd.

Matthew Hall & Co. Ltd. 12

Halliburton Oil Well Cementing Co. 38
Hill & Christopher, Inc.

Herb J. Hawthorne, Inc. 90
Brennan Advertising Agency

Houdry Process Corporation 64
Arndt, Preston, Chapin, Lamb & Keen, Inc.

Hughes Tool Co. Cover III
Foote, Cone & Belding

International Harvester Export Co. 15
McCann-Erickson Corporation

International Paints Ltd. 86
Mayfair Adv. Ltd.

International Standard Elec. Corporation 30
J. M. Mathes, Inc.

M. W. Kellogg Company 73-74
Gordon Baird Associates

Ketjen 8
Raedt en Baet

Richard Klinger Ltd. 83
S. H. Wright & Co. Ltd.

Lake & Elliot Ltd. 77
Ripley Preston & Co. Ltd.

Lane-Wells Company Cover II
Darwin H. Clark Co.

The Lummus Company 36
Sterling Advertising Agency Inc.

McCullough Tool Company 2
Richard P. Casterline Advertising

Makin Drilling Company 81

Henry Meadows Ltd. 14
General Advertising Co. of London Ltd.

Metropolitan-Vickers Electrical Co. Ltd. 4
Technical & General Adv. Ltd.

A. P. Newall & Co. Ltd. 1
Osborne Peacock Co. Ltd.

Newalls Insulation Co. Ltd. 20
Doig Advertising Ltd.

Newton-Chambers & Co. Ltd. 23
Stanley D. Dickson

Samuel Osborn & Co. Ltd. 71

D. & C. & Wm. Press Ltd. 87
Taylor Advertising Ltd.

Pye Telecommunications Ltd. 22
Arks Publicity Ltd.

The Pyrene Co. Ltd. 16
Nelson Advertising Service Ltd.

Charles Richards & Son Ltd. 79
Longleys & Hoffmann Ltd.

Schlumberger Surenco 63
Rives, Dyke & Co.

Seismograph Service Ltd. 31
Watts, Payne Advertising, Inc.

Socony-Vacuum Oil Co., Inc. 24
Compton Advertising, Inc.

Standard Oil Company of California 3
Batten, Barton, Durstine & Osborn, Inc.

Standard Oil Company of New Jersey 6
McCann-Erickson Corporation

Standard-Vacuum Oil Co. 35
Sam J. Gallay Advertising

Sun Shipbuilding & Dry Dock Co. 11
Doremus-Eshleman Co.

Triad Oil Company Ltd. 89
James Lovick & Co. Ltd.

Universal Oil Products Company 32-33
Marsteller, Gebhardt & Reed, Inc.

Vokes (Genspring) Ltd. 34
Crane Publicity Ltd.

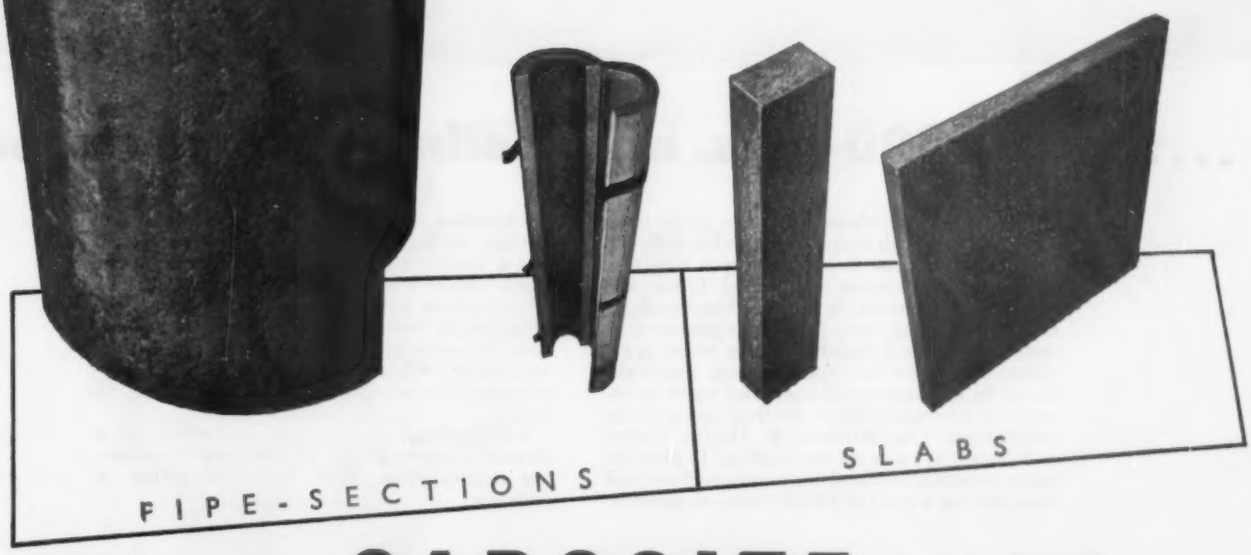
Westinghouse Electric International Co. 25
National Export Advertising Service, Inc.

Wyatt Metal & Boiler Works Cover IV
Wallace Davis & Co.

all asbestos

–and a good deal more

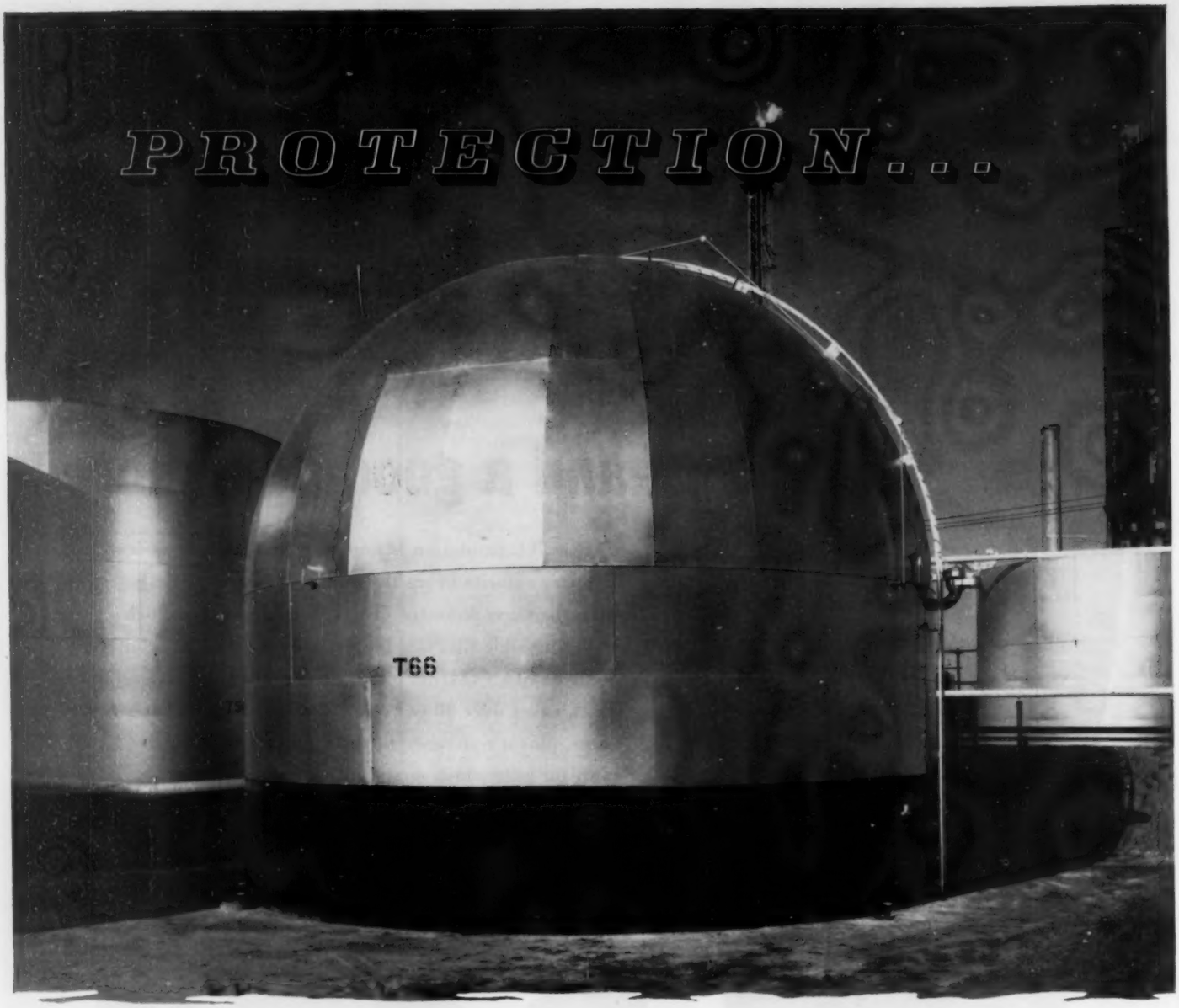
CAPOSITE insulation is not just all-asbestos. It is *all-amosite;* amosite being the uniquely long-fibred asbestos—from the Cape Asbestos Co. Ltd's own mines—which makes possible CAPOSITE'S particularly open, cellular texture. This texture gives it a level of thermal insulation which saves over 98 per cent. of uncovered hot surface losses, plus a resistance to the severest conditions of steam heat which enables it to maintain this efficiency almost indefinitely. CAPOSITE pre-formed pipe-sections and slabs are extremely strong, yet light and easy to fit; non-corrosive; and exceptionally economical. Write for full details.



CAPOSITE

100% PURE ASBESTOS INSULATION

The Cape Asbestos Co. Ltd., 114-116 Park Street, London, W.1. Tel: GROsvenor 6022



...for 130,000-bbls. of gasoline storage capacity

Volatile hydrocarbons can cause large losses in a hurry through evaporation, unless sufficient measures are taken to combat vapor displaced by thermal expansion or normal filling and emptying operations. A Horton Vaportank, as the central storage unit in a vapor conservation system, provides a variable-volume vapor space which allows the air-vapor mixture above the liquid in interconnected fixed-roof tanks to expand or contract without venting vapor to the atmosphere. The 50,000-cu. ft. Horton Vaportank above is such an installation. It provides vapor conservation facilities to sixteen fixed-roof tanks storing a total of 130,000 bbls. of gasoline.

Operation of the Vaportank is simple. A flat-bottom welded steel tank with a dome roof, it has a flexible hemispherical membrane on the inside attached at the top of the vertical shell. Vapor, which normally would be vented to the atmosphere, flows from fixed-roof tanks through large diameter piping and is stored beneath the membrane. When conditions causing the displacement are reversed, the vapor returns to the tanks.

Information, estimates or quotations on a Horton Vaportank may be obtained by writing our nearest office. There is no obligation on your part.

CHICAGO BRIDGE & IRON COMPANY

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Philadelphia • Pittsburgh • Salt Lake City • San Francisco • Seattle • Tulsa
Plants: Birmingham, Chicago, Salt Lake City and Greenville, Pa., U.S.A.
Export Office—165 Broadway Building, New York 6, N. Y., U.S.A.

REPRESENTATIVES AND LICENSEES

Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Comprimo N.V., 21, Amstel Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Horton Steel Works Limited, Fort Erie, Ontario, Canada
W. P. Bryant, Edifico Abreu 402, Havana, Cuba
Sociedade Chibridge de Construcoes Ltda., Av. General Justo, 275, Grupo 306, Rio de Janeiro, Brazil

economics

BEHIND YOUR CHOICE OF ROCK BITS

In oil well drilling, the margin between *profit* and *loss* may frequently be the difference in the performance of the rock bits you use.

That is why so many operators today select Hughes bits in setting up bit programs for their wells. They know from experience that in established areas they can project drilling costs from the performance of Hughes bits.

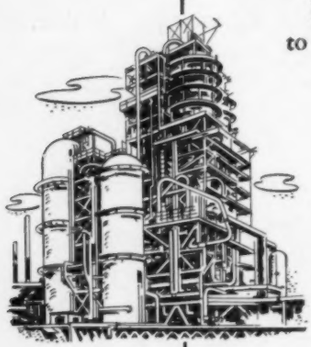
Let the Hughes representative in the area in which you are operating help you set up the bit program on your next well. He is familiar with the bits that can get you on and off the job in the shortest possible time.

STABILITY

It is Wyatt's policy to maintain financial structure to match its plant structure. This surplus item in the assets column is in reality just another working tool.

As processing equipment becomes larger and more intricate, Wyatt's plants must be enlarged and fitted to meet their obligation. That is when a surplus ceases to be cash on hand and goes to work itself.

Putting some of the profit back in the business also gives a lift to employment, since men go to work as dollars go to work.



Wyatt's

HOUSTON-DALLAS-NEW YORK-TULSA

MANUFACTURERS AND ERECTORS SINCE 1913